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ABSTRACT

Intergovernmental grants are a significant part of both federal and state budgets. This report examines the federal grant-in-aid system from the perspective of fiscal impact. It focuses on the extent to which the grant system succeeds in two objectives: (1) encouraging states to use federal dollars to supplement rather than replace their own spending on nationally important activities; and (2) targeting grant funding to states with relatively greater programmatic needs and fewer fiscal resources. The first major finding is that every additional federal grant dollar results in less than a dollar of total additional spending on the aided activity: the estimates of substitution clustered around 60 cents of every federal dollar. Therefore, part of the fiscal impact of these transfers is to free up a portion of state funds for other state programs or tax relief. In addition, federal aid is not targeted to offset fiscal imbalances among states with different programmatic needs and fiscal resources. The second major finding is that grant design influences fiscal substitution. Design features work by restricting the use of funds to specify purposes, requiring recipients to contribute their own funds to obtain grant funds, and not restricting federal matching of state funds. Finally, the study found that grants lack features to discourage substitution. Four figures and 11 tables are included. Appendices contain information on the role of grants in the federal system, the research design, three grant design features related to substitution, statistical analyses, challenges in measuring grant-targeting factors, and a list of major contributors to the report. (Contains a 24-item list of related GAO products and 51 references.) (LMI)

United States General Accounting Office

GAO

Report to the Chairman, Committee on the Budget, House of Representatives

December 1996

FEDERAL GRANTS

Design Improvements Could Help Federal Resources Go Further

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United States
General Accounting Office
Washington, D.C. 20548

Accounting and Information
Management Division

B-272987

December 18, 1996

The Honorable John R. Kasich
Chairman, Committee on the Budget
House of Representatives

Dear Mr. Chairman:

This report responds to your request that we examine the federal grant-in-aid system from the perspective of fiscal impact. Grants-in-aid are payments from the federal government to state and local governments to help them finance activities in areas such as public assistance, highway construction, and education.[1] In addition to these well known areas, grants also finance many lesser known areas, such as public libraries, sport fish restoration, and boating safety. In fiscal year 1995, the federal government allocated $225 billion for more than 600 grant programs—about 15 percent of total federal spending and 23 percent of total state spending. However, the largest 87 programs accounted for 95 percent of total grant funds.

Federal grants have been established to achieve a variety of goals, and it is for the Congress to decide among the various objectives for grants and the manner in which the federal government allocates the aid. In this report, you asked us to focus on the extent to which the grant system succeeds in two objectives frequently cited by public finance experts: (1) encouraging states to use federal dollars to supplement rather than replace their own spending on nationally important activities and (2) targeting grant funding to states with relatively greater programmatic needs and fewer fiscal resources.

The first issue concerns the extent to which federal grant dollars replace state dollars, often referred to as substitution or supplantation. Public finance experts suggest that one objective of federal grants is to increase spending beyond what states would have spent anyway for the aided services. However, to the degree states use federal funds to free up their own resources for other state priorities, specific-purpose federal funds are, in effect, converted to general fiscal relief. The second issue concerns the extent to which federal dollars are distributed to balance differences among the states in three areas—program needs, ability to fund grant activities without federal assistance (state fiscal capacity), and service costs.

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[1]Hereafter, we use state to mean state and local governments and/or their agencies.

This examination of the fiscal impact of grants adds to a larger body of GAO work on design issues in certain federal subsidy programs. It expands on our case studies of grant targeting for specific programs by analyzing all formula grants and helps to answer whether grants, like some loan programs and tax expenditures we have examined, experience efficiency losses as funds flow through a network of third parties, who either have their own spending priorities or would have undertaken the subsidized activity even without federal assistance.[2]

Results in Brief

For the most part, the federal grant system does not encourage states to use federal dollars as a supplement rather than a replacement for their own spending on nationally important activities, nor is every grant intended to do so. Grants are unlikely to supplement completely a state's own spending. Thus, some substitution is to be expected in any grant. Our review and analysis of economists' most recent estimates of substitution suggests that every additional federal grant dollar results in less than a dollar of total additional spending on the aided activity. The estimates of substitution clustered around 60 cents of every federal dollar. This means that about 60 cents of every federal grant dollar substitutes for state funds that states otherwise would have spent. Excluding extreme high and low values, substitution estimates ranged from 11 to 74 cents. Therefore, part of the fiscal impact of these transfers is to free up a portion of state funds for other state programs or tax relief.

With the responsibilities of states increasing in the federal system, some observers may view this substitution as a legitimate means of providing states fiscal relief and budgetary flexibility. The Congress has various criteria available to address how such relief should be allocated among the states. Applying the goals of fiscal targeting articulated by public finance experts, we examined the extent to which the fiscal relief provided by grants is allocated to states with relatively greater programmatic needs and fewer fiscal resources. Our analysis indicated that federal aid is not targeted to offset these fiscal imbalances. Consequently, lower income states face greater fiscal strain in financing federally aided services than higher income states with lower measurable needs. In addition, our prior case studies of specific grants programs—including the areas of transportation, employment, education, and health—showed that funding in these individual programs was not allocated to states in a targeted

[2]See Deficit Reduction: Opportunities to Address Long-Standing Government Performance Issues (GAO/T-OCG-95-6, September 13, 1995); Budget Issues: Selected GAO Work on Federal Financial Support of Business (GAO/AIMD/GGD-96-87, March 7, 1996); and Addressing the Deficit: Updating the Budgetary Implications of Selected GAO Work (GAO/OCG-96-5, June 28, 1996).

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manner. Our analysis also suggested that the practice of placing constraints in grant formulas to assure all states a minimum amount of funding has contributed to this lack of targeting.

These fiscal substitution and targeting results reflect the way in which most of the 633 federal grants we examined are designed. In particular, a majority of the 87 largest grant programs did not include features, such as state maintenance-of-effort and matching requirements, that can encourage states to use federal funds as a supplement rather than a replacement for their own spending. Also, we found that most grant formulas do not allocate funds using a combination of the three factors that we have reported can improve grant targeting—programmatic needs, fiscal capacity, and service costs.

A number of strategies for increasing the fiscal impact of grants are available to the Congress, depending on the value the Congress places on this goal relative to other grant goals and objectives. Grant redesign is one strategy. If reducing substitution is a desired goal, the Congress could add or strengthen matching and maintenance-of-effort provisions for grant programs. If targeting fiscal relief to states with greater fiscal stress is a desired goal, grant formulas could be changed to include a combination of factors that allocate a larger share of federal aid to those states with relatively greater program needs and fewer resources. In redesigning grants, however, the Congress would need to consider how best to balance any increase in federal grant restrictions needed to reduce substitution against the decreases in state budgetary flexibility and discretion that might result. And, if states do not share the federal government's programmatic objectives, high levels of substitution may occur even after design changes.

Alternatively, the Congress could decide that redesign is not its preferred approach and that particular programs no longer represent the best use of scarce federal resources. This strategy would free up budgetary resources that could be used to reduce the deficit or invest in more promising programs. Like the first strategy, however, grant spending cuts also involve tradeoffs. Depending on the size and area of the reductions, states would incur varying degrees of budgetary stress and might face the prospect of increased state taxes, cuts in state programs, or some combination of both.

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Background

Intergovernmental grants are a significant part of both federal and state budgets. From the first annual cash grant under the Hatch Act of 1887, the number of grant programs rose to more than 600 in 1995 with outlays of $225 billion, or about 15 percent of total federal spending. Most federal grant programs are small and serve narrow purposes, while a few large programs—such as Medicaid and the Highway Planning and Construction Program—dominate the grant-in-aid system. Of the 633 grants we reviewed, 87 programs—or 14 percent—accounted for 95 percent of total grant funding.

In 1995, federal grants accounted for about 23 percent of total state spending. Here too there is variation in the federal share of state spending across categories used by the Census Bureau. Grants accounted for about 60 percent of public welfare and 64 percent of housing and community development spending. The federal share was much smaller in other categories, about 8 percent overall.

In theory, grants are to serve purposes beyond returning resources to taxpayers in the form of state services. Grants also can serve as a tool to encourage states to spend federal funds for nationally important activities for which they otherwise would have spent less. The amount of additional spending is affected by the degree to which federal grant funds actually supplement state funds. Public finance literature uses the term substitution to characterize situations in which states use federal grant dollars to reduce their own spending for the aided program either initially or over time. To illustrate how substitution works, if states use federal funds to replace state spending on a dollar-for-dollar basis, then federally aided state services would remain at pre-grant levels—in which case the fiscal impact of the additional federal dollar on the intended program is zero. In practice, substitution effects are not this extreme; total state spending rises upon receiving federal grant funds—but by less than the full amount of the grant because states reduce their own spending for the area. In effect, substitution allows a portion of federal grant funds to be spent on other state priorities.

Figure 1 illustrates how substitution would work for a hypothetical state spending $5 on an activity and receiving $1 in federal grant funds for that activity. As previously noted, federal grant dollars are rarely used dollar-for-dollar to supplement state spending on aided activities. However, we show this case in the top part of the figure as a contrast to the expenditure level that might result when substitution occurs. We show substitution at 60 cents to correspond to the approximate midpoint of the

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range of estimates we reviewed. The figure indicates that with substitution, although the federal grant dollar is spent on the aided program, the state can reduce its own spending by about 60 cents so that total spending increases by 40 cents. The state can then reallocate the 60 cents that has been freed up. In this regard, the figure shows the two options cited by economists—spending on other state priorities or tax relief. For example, states could spend their freed up funds for other public goods they value, such as education, transportation, or corrections. Or, states could reduce or maintain existing tax rates or slow the rate of increase.

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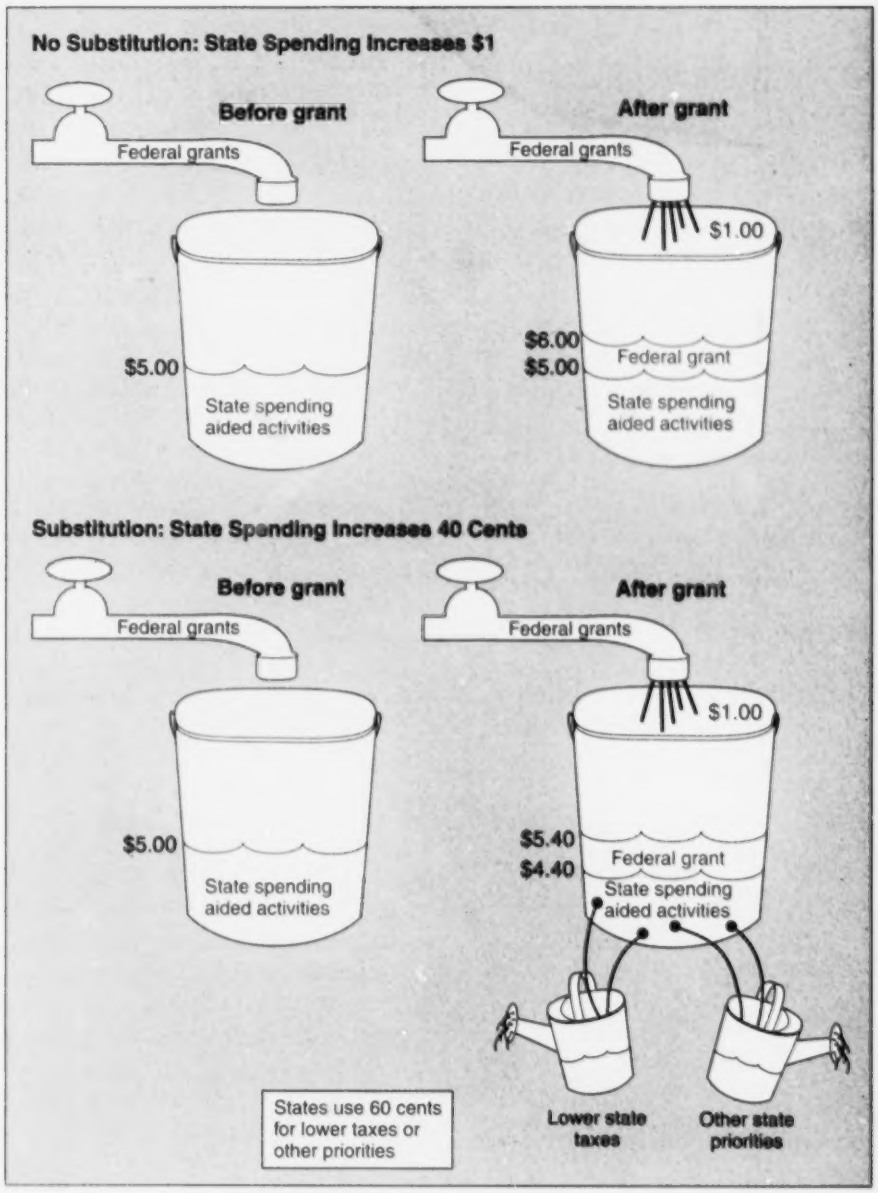
Figure 1: Illustrative Impact of $1 in Federal Grants on State Spending on Aided Activities, With and Without Substitution



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As noted, there are a variety of approaches available to distribute grants among the states. Public finance experts suggest that grants can be targeted to states with relatively greater programmatic needs and fewer fiscal resources. In program areas where states share financing responsibilities with the federal government, service levels depend to an important extent on state fiscal capacities. For example, after adjusting for differences in state service costs, the fiscal burden on Mississippi of providing a given level of public services is greater than the burden on Connecticut because Mississippi has about three-fourths the tax base of Connecticut. Where the federal government has sought a minimum or more comparable level of a service for all potential beneficiaries—regardless of where they live—grants can help reduce disparities between the capacities of wealthier and poorer communities to provide that service. Our past studies of individual grant programs have led us to conclude that grants can be designed to reduce differences between states' fiscal resources and programmatic needs by designing formulas that allocate funds according to measures of states' program needs, fiscal capacities, and service costs.[3] In those studies, we also commented on the importance of using data that accurately capture differences in these factors across states.

Other Roles Grants Have Played

The objectives examined in this report are those most often put forward by public finance experts: (1) encouraging states to spend more for public goods that appear underfunded from a national perspective, and (2) offsetting the differences between states' programmatic needs in federally aided functions and their fiscal resources. Grants have played other roles in intergovernmental relations as well. For example, grants have been used to provide states with (1) funding to offset the costs of meeting federal regulatory standards or administering federal regulatory programs, (2) counter-cyclical assistance in times of economic downturns, (3) general purpose fiscal assistance (e.g., general revenue sharing), and (4) performance incentives to improve or enhance existing programs. Appendix I contains a more detailed discussion of the various roles grants have played.

Scope and Methodology

To examine substitution in the grant system, we synthesized the body of econometric literature which statistically isolated the fiscal impact of federal grant funds and estimated their impact on total spending. We used this approach because conventional auditing methods were not sufficient

[3]The related GAO products listing at the end of this report contains references to this work.

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to answer the questions about substitution. Such methods do not control for state spending that would have occurred without a federal grant and cannot sort out the effects of other factors, such as population and state income growth, that also influence state spending. Thus, an audit of a federal grant program might demonstrate that all federal funds were spent on the authorized activities. However, because the audit could not observe the level of state spending that would have occurred without the grant, it could not detect substitution in the form of reductions from that unobserved level.

To examine targeting in the grant system, we developed a statistical model to determine the extent to which federal aid in the aggregate is allocated to offset differences between state programmatic needs and fiscal resources (see appendix IV for a description of this model). We did not analyze targeting for individual grant programs because there is less consensus on—and few readily available and suitable proxies for—measures of individual grant program needs and costs. For this reason, our prior work on federal grant targeting has proceeded using a program-by-program approach, with each case study requiring substantial work to identify and validate suitable proxies for state programmatic needs and costs. For this report, our model used state population as the primary measure of state programmatic need. The model also controlled for a variety of other state need indicators, such as measures of poverty, housing age, highway mileage, and service costs. Controlling for programmatic needs and costs enabled us to isolate more accurately the statistical effect of state fiscal capacities on federal grant allocations.

In addition to this statistical analysis, our examination of substitution and targeting included (1) a comprehensive review of over 120 journal articles, reports, and econometric studies on substitution, targeting, and grant design factors related to both, (2) a synthesis of 50 econometric studies of federal grants, culminating in the development of point and range estimates of fiscal impact overall as well as for different time periods and grant designs, (3) a review of 23 GAO reports on options to achieve greater targeting in specific formula grant programs, and (4) an analysis of grants for design features associated with substitution and targeting. Our analysis of the design features associated with fiscal substitution was for both all 633 grants and separately for the largest 87 programs representing 95 percent of grant funds. Our analysis of the design features associated with targeting was for the 149 formula grants that represented 85 percent of grant funds. We excluded project grants, which are awarded on a

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discretionary basis, because of the difficulty of generalizing about targeting based on individual grant decisions.

Because grant implementation issues were outside the scope of our analysis, this report cannot be used to draw conclusions about how well a jurisdiction uses grant funds or who benefits. In addition to design features, two important determinants of a grant's fiscal impact are states' priorities, which may differ from the federal government's, and program management, which may differ across states. To illustrate, a grant for computer education programs might feature few of the design features to limit substitution, but shared goals and objectives could result in states using the grant funds they receive to increase substantially total spending on computer education. Or, a grant for health services to low-income children could lack equity factors that target funds to states with higher concentrations of such children. Notwithstanding the lack of targeting, however, a state could still spend more of each federal assistance dollar it receives to serve its low-income children than another state receiving more grant funds. Just as the presence of suitable design features does not guarantee that funds will be allocated efficiently or equitably, so the absence of such features alone does not prove that they are not.

We asked well-known public finance experts as well as experts on state and local government to review a draft of this report and incorporated their suggestions where appropriate. Appendix II contains a more detailed description of our scope and methodology.

Grant Design Influences Fiscal Substitution

The economic literature we reviewed suggested that three types of grant design features affect the likelihood that states will use federal funds to supplement, rather than replace, their own spending. These features work by (1) restricting the use of funds to specified purposes, (2) requiring recipients to contribute their own funds to obtain grant funds, and (3) not restricting federal matching of state funds.

The first type of feature concerns the extent to which grant purposes are restricted. Categorical grants, which fund narrow-purpose activities, such as nutrition for the elderly, are the most restricted. Block grants, which fund broader categories of activities, such as community development, are less restricted. General purpose grants, such as revenue sharing, require only that the funds be spent for government purposes. Generally speaking, experts agree that conditions attached to aid can encourage states to use federal funds as a supplement if the conditions are binding. Conditions are

more likely to be binding if states are not already spending their own funds for that purpose. For example, a state with no computer education program in its schools would be more likely to spend a federal computer education grant on its intended purpose than a state that had already invested its own funds in such a program. If the state that had already invested funds in computer education was satisfied with pre-grant spending levels, it would be more likely to substitute the federal grant funds for its own and shift state funds to other priorities.

The second type of feature concerns requirements that states contribute their own funds in order to receive federal matching funds. Economic theory suggests that grants requiring matching result in less substitution than those that do not because, by lowering the effective price of aided programs relative to other state spending priorities, they encourage states to invest more of their own funds. Matching grants typically contain either a single rate (e.g., 50 percent) or a range of rates (e.g., 50 percent to 80 percent) at which the federal government will match state spending on an aided program. Experts agree that federal matching rates should correspond to the share of benefits that accrue to non-state residents. Public finance economists have argued that federal shares of less than 50 percent are appropriate, recognizing that in-state residents generally receive the predominant share of the benefits from most federally aided programs, such as education or transportation.

Another feature, maintenance-of-effort, requires states to maintain existing levels of state spending on an aided program as a condition of receiving federal funds. By requiring states to maintain a given level of spending from their own funds in addition to the federal grant funds they receive, maintenance-of-effort can prevent substitution in those programs where there is no federal matching requirement or where state spending exceeds the minimum required state match.

As we have noted elsewhere, designing effective maintenance-of-effort provisions can be difficult because it requires balancing federal interests against states' desire for flexibility in planning and implementing grant programs.[4] Experts suggest that maintenance-of-effort provisions should keep pace with both inflation and program growth so that state spending efforts are truly maintained over time. But maintenance-of-effort requirements can penalize states that take the initiative to start programs without federal aid by locking them into prior spending levels when federal grant funds become available. In contrast, states without prior

[4]Block Grants: Issues in Designing Accountability Provisions (GAO/AIMD-95-226, September 1, 1995).

spending programs are implicitly rewarded for their lack of initiative because they would be required to maintain a lower base of spending in exchange for the federal grant. As a result, the prospect of such requirements could defer state program innovation until federal funds become available.

The third type of feature concerns the extent to which federal funding for a program is limited. Grants are considered "open-ended" when there is no limit on federal matching, and "closed-ended" when total federal matching funds are capped. The influence of federal matching is essentially the same for both types of grants until a state obtains the maximum federal contribution for a closed-ended grant. After this point, closed-ended grants no longer match additional state spending on aided activities and lose their price incentive. Therefore, a state spending beyond the amount needed to obtain maximum federal funding is doing so without any price inducement. From this economists have concluded that the state would likely have spent some its own funds without the federal matching incentive, and federal funds have substituted for some of the state's own resources.

Although we discuss the influence of grant design in terms of isolated features, in practice they work in combination. For example, when total federal spending for a grant is capped, maintenance-of-effort provisions that track inflation and program growth can increase the likelihood that federal dollars will supplement rather than replace state spending even after the cap is reached. Similarly, a grant which allows a wide range of uses within a broadly defined federal objective may still contain matching and/or maintenance-of-effort features to reduce the likelihood of substitution. Appendix III contains a more detailed discussion of the grant design features that influence state spending.

Apart from design features, other factors, such as the amount of state spending relative to federal spending and state programmatic preferences, can also influence the impact of a federal grant on total spending. For example, a non-matching categorical grant without maintenance-of-effort is more likely to supplement state spending in areas where state governments have invested few, if any, of their own funds. Conversely, when a state is already spending an amount from its own resources that exceeds the amount of federal aid for a program, categorical restrictions are less likely to be effective because the state could spend all the grant funds on the intended program, but reduce spending from its own funds by the same amount. In this case, the categorical grant has the same effect on

total program spending as an unrestricted grant, and the state will use the resources released in accordance with its own spending priorities, which will not necessarily be the same as the federal government's.

Studies Show Grants Replace a Portion of State Funds

There is a substantial body of econometric research on the impact of federal grants on state spending spanning the period from the late 1950s to recent years. Our review and synthesis of this body of work found that beginning around 1978, a consensus view emerged that each additional federal grant dollar contributed to increased total spending on aided functions, but, because of substitution, total spending increased by less than a dollar.[5] Of the studies we reviewed, three-fourths of the estimates from studies published since 1978 indicated some substitution, i.e., that $1 of federal grant aid did not increase total spending in a state by $1. Estimates from these studies suggest that a median of nearly 60 cents of every federal dollar is used to replace state and local funds that otherwise would have been spent on the aided activity. That is, for every dollar of additional federal aid, states have withdrawn about 60 cents of their own spending. Omitting extreme high and low estimates, the middle 50 percent (mid-range) of these estimates was between 11 and 74 cents. Table 1 contains a summary of the grant impact estimates we reviewed.

[5]We relied on post-1978 studies because two definitive critical reviews of the literature by Barro (1978) and Gramlich (1977) provided a baseline of information and a standard of analysis for all subsequent research. The post-1978 studies featured methodological improvements, notably longer time periods of study and controls for factors that simultaneously influence state spending and federal grant levels. Many of the earlier studies critiqued by Barro and Gramlich concluded that grants stimulated additional state spending. These conclusions were generally discounted, however, because the studies generally used flawed models, relied on a single year of data, and/or lacked a basis in economic theory. Thus, while studies both before and after 1978 focused on the question of the fiscal impact of federal grants, the principal difference was that the post-1978 studies generally used more advanced techniques to arrive at their conclusions.

Table 1: Summary of Econometric Estimates of the Impact of an Additional Dollar of Federal Grants on Total Spending for Aided Activities

Subset of estimates[a]	Median estimated impact of $1 in federal grants on total spending[b]	Mid-range of estimated impacts		(Substitution) or increase implied by median estimated impact[c]	Number of estimates
		25th percentile estimate	75th percentile estimate		
1978-present[d]	$0.42	$0.26	$0.89	$(0.58)	37
State matching of federal funds[e]					
Non-matching programs	0.42	0.25	0.50	(0.58)	13
Matching programs	0.85	0.33	1.14	(0.15)	24
Limits on federal share					
Closed-ended, matching programs	0.54	0.37	1.04	(0.46)	8
Open-ended, matching programs	$1.38	$0.71	$1.74	$0.38	15

[a]Only two estimates were characterized as pertaining to unrestricted grants and only one as pertaining to grants with maintenance-of-effort. Therefore, we did not include those results as a separate subset.

[b]Calculated as the median, or middle, estimate of the range of estimates we examined. "Total spending" refers to a state's spending from all revenue sources, including federal grants. Thus, a $0.42 impact means that for every $1 in federal grants, total spending from all sources goes up 42 cents.

[c]Calculated by subtracting the $1 in federal grants from the median estimate of total state spending. Numbers in parentheses are negative and imply substitution. Positive numbers imply states spend more from their own funds in response to federal grants.

[d]The year a study containing an estimate was published. The periods of state and local spending examined in the studies ranged from 1942 to 1990, but centered on the 1960s to the 1970s.

[e]Because a limited number of studies characterized grants as open-ended, matching, etc., we analyzed estimates by design feature over the entire time period reviewed. This approach was appropriate for identifying relative differences in impact across design features. However, it would be inappropriate to draw firm conclusions about the point estimates for grants with the designs identified.

Source: Studies listed in bibliography.

As shown in table 1, the econometric studies we reviewed support the view that certain grant design features promote relatively more total spending on aided activities. Matching programs generally involved less substitution than non-matching programs. Our synthesis suggests that 85 cents of every additional matching dollar represented new spending, implying that states have withdrawn 15 cents of their own resources. For non-matching programs, 42 cents of every additional federal dollar resulted in new spending, implying that states have withdrawn 58 cents of their own resources. Open-ended programs were associated with the

smallest amount of substitution and may even have stimulated additional state spending over and above the amount of federal aid they received. Every additional federal dollar for open-ended matching programs resulted in $1.38 of new spending, suggesting that states have contributed 38 cents of their own resources to such programs. Given that the estimates for open-ended programs ranged from 71 cents (substitutive) to $1.74 (stimulative), caution should be used in drawing the conclusion that such programs generally have stimulated additional state spending. However, as the first column in the table shows, the expenditure impacts of open-ended programs generally exceeded those of closed-ended programs, which resulted in a median of 54 cents of new spending (ranging from 37 cents to $1.04).

The studies we reviewed examined the impact of grants on total spending as well as on categories of spending for service areas, such as education, health, highways, and welfare. Our analysis did not provide support for any differences in the expenditure impact of grants across those service areas. Nevertheless, studies from the 1980s and 1990s in the areas of education, highways, and sewage suggested that states have withdrawn some of their own funds in response to federal grants. For example:

- Education: Craig and Inman's (1982) study of the impact of an additional dollar of federal education grants to state and local governments on total education spending from federal, state, and local sources found substitution effects ranging from more than a dollar for unrestricted federal grants (total spending decreased $1.06 for each $1.00 in grants) and non-matching, categorical grants (total spending decreased $1.30),[6] to 14 cents for grants with maintenance-of-effort provisions (total spending increased 86 cents). The study found matching categorical grants actually had fiscal impacts on total education spending that were larger than $1.00 (total education spending increased $1.05).
- Highways: Meyers (1987) and Stotsky (1991) studied the impact of an additional dollar of closed-ended matching grant funds for highway construction on state spending and found substitution rates of 63 and 95 cents, respectively. That is, for every $1 in federal aid, states used between 63 and 95 cents to fund other priorities. Meyers also tested whether the 63 cents of federal funds that was not spent on highway construction was used for tax relief. He rejected that hypothesis, finding instead that states most likely used the funds for other non-aided transportation priorities, such as maintenance.

[6]The authors hypothesize that total reductions in education spending may have occurred as states reacted to the increases in federal funding of local education by reducing their own education aid to local governments by more than the increase in federal funding.

- Sewage systems: Jondrow and Levy's (1984) study of the impact of an additional dollar of Environmental Protection Agency sewage system construction grants on local spending on sewage systems found that local governments substituted 67 cents for their own spending on sewage treatment plants and sewer lines. The authors also estimated the impact of federal grants on sewer lines alone and found complete substitution. The authors concluded that this occurred because, unlike treatment plants which generate benefits for surrounding localities, sewer lines have purely local benefits and would be fully funded even without a federal grant. Therefore, the federal grants simply displaced, rather than supplemented, local spending.

Because most of the research we reviewed studied periods when resources and spending were increasing, caution should be used in drawing conclusions about how states would respond to reductions in federal grant spending. Evidence of substitution does not necessarily mean that states would replace cuts in federal grant programs with funds from their own sources. However, states may be more likely to replace cuts in federal funds used to fund ongoing state operations and priorities. From a federal perspective, this state replacement might be viewed as a positive event. But from a state perspective, because federal funds have been woven into the structure of state budgets, replacing cuts in federal funds would require cutting funds for other state programs, raising taxes, or both.

Few have studied state responses to federal aid reductions, and those that have provide a mixed picture. Using a case study approach, Nathan (1987) found that state governments replaced funding for some federal programs cut during the 1980s, particularly those that were not highly redistributive, had active constituencies, or were primarily managed by state rather than federal agencies. Our prior work on the effect of reductions in federal grants during the 1980s generally supported Nathan's conclusion that states replaced some of the federal cuts.[7] We reported that states used three strategies to mitigate federal funding reductions that occurred in most block grant programs during the early 1980s. These involved states (1) taking advantage of available funds from the categorical programs that preceded the block grants, (2) transferring funds among block grants, and (3) increasing the use of state funds. However, in a more recent econometric study of local responses to federal cutbacks

[7]See Block Grants Brought Funding Changes and Adjustments to Program Priorities (GAO/HRD-85-33, February 11, 1986).

during the 1980s, Stine (1994) found that local governments did not raise local revenues to replace permanent losses in federal aid.

Grants Lack Features to Discourage Substitution

Currently, the grant system is comprised of 633 conditional grants, of which 617 are narrow-purpose categorical grants and 16 are broader-purpose block grants. The federal government has not provided any unconditional grants since the General Revenue Sharing program, which ended in 1986.[8] Table 2 summarizes the design features of all 633 grants. However, because 95 percent of the funds are associated with the 87 largest grant programs, we also summarized the design features of the 87 largest grants in table 3.

Table 2: Grants With Design Features Associated With Substitution, Fiscal Year 1994

	Grants with each feature		Fiscal year 1994 obligations	
Grant design feature	Number	Percent	Dollars in billions	Percent
Broad-purpose (block)	16	2.5	$52.9	24.7
Categorical	617	97.5	161.2	75.3
Nonmatching	318	50.2	67.5	31.5
Matching, federal share exceeds 50 percent	252	39.8	144.0	67.2
No maintenance-of-effort	599	94.6	94.9	44.3
Closed-ended	617	97.5	109.0	50.9
Total	**633**	**100.0**	**$214.1**	**100.0**

Source: ACIR, Characteristics of Federal Grant-in-Aid Programs to State and Local Governments, Grants Funded FY 1995, June 1995, Executive Office of the President, Office of Management and Budget, and U.S. General Services Administration, Update to the 1995 CFDA, December 1995.

[8]Several programs continue to provide general purpose fiscal assistance to selected jurisdictions, such as payments in lieu of taxes or sharing of receipts generated by the sale or lease of natural resources on federal lands. According to OMB, these funds account for about 1 percent of federal grants-in-aid. The ACIR publication we relied on excluded such shared revenue programs from its list of grants.

Table 3: Grants With Design Features Associated With Substitution, Largest 87 Programs, Fiscal Year 1994

Grant design feature	Grants with each feature		Fiscal year 1994 obligations	
	Number	Percent	Dollars in billions	Percent
Broad-purpose (block)	15	17.2	$52.9	26.0
Categorical	72	82.8	150.4	74.0
Nonmatching	46	52.9	62.0	30.5
Matching, federal share exceeds 50 percent	38	43.7	139.7	68.7
No Maintenance-of-effort	71	81.6	84.8	41.7
Closed-ended	77	88.5	98.4	48.4
Total	**87**	**100.0**	**$203.3**	**100.0**

Source: ACIR, Characteristics of Federal Grant-in-Aid Programs to State and Local Governments, Grants Funded FY 1995, June 1995, Executive Office of the President, Office of Management and Budget, and U.S. General Services Administration, Update to the 1995 CFDA, December 1995.

Of the 87 largest grant programs, 15 were block (26 percent of funds) and 72 were narrow-purpose, categorical (74 percent of funds). To some extent, then, the federal grant system is designed around narrow federal purposes, suggesting fewer opportunities for substitution. However, if states are already spending more of their own funds than the federal government provides for these block and categorical programs, the purposes for which the federal aid is to be spent are less likely to be binding, and the potential for substitution is higher.

With regard to other design features we reviewed, few federal grants contain the combination of design features that would encourage states to maintain their spending levels and reduce the extent of substitution. About half the 87 largest grants, representing 30 percent of the funds for those programs, did not require state matching. Of the grants containing matching provisions, almost all had federal shares in excess of 50 percent. This stands in contrast to expert views that federal shares should generally be less than 50 percent to correspond with the benefits non-state residents receive.[9] In sum, 97 percent of the largest grants—corresponding to 99 percent of total grant funds—had federal shares between 50 and 100 percent.

Furthermore, 89 percent of the largest grant programs—representing 48 percent of the funds for those programs ($98.4 billion)—were

[9]Gramlich, Edward M., "Federalism and Federal Deficit Reduction," National Tax Journal, Vol. 40, No. 3, September 1987, pp. 299-313. Oates, Wallace E., "Federalism and Government Finance," John M. Quigley and Eugene Smolensky, ed., Modern Public Finance, Harvard University Press, Cambridge, MA, 1994, pp. 126-161.

closed-ended. Excluding the largest open-ended program—Medicaid—from this total, 85 percent of the remaining grant funds were for closed-ended programs. Closed-ended programs may result in substitution when state spending exceeds the amount necessary to obtain federal matching funds. At this level of spending, unless strong maintenance-of-effort provisions are attached, the federal match loses its price incentive, and can become—in effect—general purpose income to states. According to a number of studies we reviewed, state spending for most closed-ended grant programs was well beyond the amount needed to obtain the maximum level of federal funds.[10] Because this additional state spending has occurred without the incentive provided by federal matching rates exceeding 50 percent, the studies concluded that such generous federal matching rates may be unnecessary to induce existing levels of state spending in those areas.

Finally, 16 of the largest 87 programs—representing 58 percent of the funds for those programs—had maintenance-of-effort provisions that would encourage states to maintain a defined contribution to those programs. A well-designed maintenance-of-effort provision can deter substitution in a grant program, particularly in those programs with no matching requirement or where state spending already exceeds the amount needed to meet federal matching requirements. To determine if federal maintenance-of-effort provisions were designed to keep pace with program growth, we looked at the top eight closed-ended programs with maintenance-of-effort provisions. We found that none of the maintenance-of-effort provisions sampled were designed to keep pace with inflation or case-load growth. For example, the maintenance-of-effort requirement for the Special Programs for the Aging grant stipulates that states need only spend an amount equal to the average of the 3 previous fiscal years in order to avoid reduced federal funding. States could maintain spending at this historical average and still substitute. Substitution could occur if states use new or increased federal funds to finance case-load growth or inflation they otherwise would have had to finance. Tables 4 and 5 summarize by budget function the design features of all 633 grants and the largest 87 grants, respectively.

[10]Miller (1974), Bezdek and Jones (1988), Huckins and Carnevale (1988), Gramlich (1990), and Oates (1994).

Table 4: Grants With Design Features Associated With Substitution, by Budget Function, Fiscal Year 1994

	Grant design features (percent of			
	Broad-purpose		Non-matching	
Budget function	**Grants**	**Funds**	**Grants**	**Funds**
National defense	0.0	0.0	12.5	2.5
General science	0.0	0.0	33.3	42.0
Energy	0.0	0.0	50.0	64.6
Natural resources	0.0	0.0	34.9	10.7
Agriculture	0.0	0.0	46.7	24.6
Commerce & housing credit	0.0	0.0	25.0	21.4
Transportation	5.4	84.8	16.2	0.0
Community & regional development	5.0	54.5	35.0	76.1
Education, training, employment, & social services	1.9	19.6	58.9	64.9
Health	4.5	2.3	69.6	6.8
Income security	6.8	49.2	52.3	65.4
Veterans benefits	0.0	0.0	0.0	0.0
Administration of justice	0.0	0.0	79.2	33.7
General government	0.0	0.0	0.0	0.0
Multiple (999)	0.0	0.0	29.4	97.4
Total	**2.5**	**24.7**	**50.2**	**31.5**

function total)		Grant design features (percent of function total)				Total	
Matching, federal share exceeds 50 percent		No Maintenance-of-effort		Closed-ended			
Grants	Funds	Grants	Funds	Grants	Funds	Grants (number)	Funds (dollars in billions)
87.5	97.5	100.0	100.0	100.0	100.0	8	$0.30
33.3	3.2	100.0	100.0	100.0	100.0	3	0.01
33.3	32.0	100.0	100.0	100.0	100.0	12	0.19
55.4	88.1	94.0	88.4	100.0	100.0	83	3.23
26.7	19.1	100.0	100.0	100.0	100.0	15	0.97
50.0	42.3	100.0	100.0	100.0	100.0	8	0.08
73.0	99.6	97.3	100.0	100.0	100.0	37	25.15
65.0	23.9	97.5	97.7	100.0	100.0	40	7.77
33.3	34.0	92.3	64.5	99.0	91.8	207	35.64
18.8	92.8	96.4	8.5	99.1	9.0	112	95.80
31.8	31.9	84.1	50.4	79.5	69.0	44	36.94
100.0	100.0	100.0	100.0	40.0	43.4	5	0.27
16.7	66.3	100.0	100.0	100.0	100.0	24	0.66
0.0	0.0	100.0	100.0	100.0	100.0	1	0.00
58.8	2.3	100.0	100.0	97.1	51.4	34	6.99
39.8	**67.2**	**94.6**	**44.3**	**97.5**	**50.9**	**633**	**$214.09**

Source: ACIR, Characteristics of Federal Grant-in-Aid Programs to State and Local Governments, Grants Funded FY 1995, published June 1995; Executive Office of the President, Office of Management and Budget and U.S. General Services Administration, Update to the 1995 CFDA, December 1995.

Table 5: Grants With Design Features Associated With Substitution, Largest 87 Programs, by Budget Function, Fiscal Year 1994

	Grant design features (percent of			
	Broad-purpose		Non-matching	
Budget function	Grants	Funds	Grants	Funds
National defense	0.0	0.0	0.0	0.0
Natural resources	0.0	0.0	0.0	0.0
Agriculture	0.0	0.0	0.0	0.0
Transportation	50.0	86.8	0.0	0.0
Community & regional development	25.0	57.7	50.0	77.4
Education, training, employment, & social services	14.8	21.9	63.0	65.9
Health	21.1	2.3	68.4	5.4
Income security	17.6	50.2	47.1	65.2
Administration of justice	0.0	0.0	0.0	0.0
Multiple (999)	0.0	0.0	100.0	100.0
Total	**17.2**	**26.0**	**52.9**	**30.5**

function total)							
Matching, federal share exceeds 50 percent		Grant design features (percent of function total)				Total	
		No Maintenance-of-effort		Closed-ended			
Grants	Funds	Grants	Funds	Grants	Funds	Grants (number)	Funds (dollars in billions)
100.0	100.0	100.0	100.0	100.0	100.0	1	$0.26
100.0	100.0	75.0	90.1	100.0	100.0	4	1.85
50.0	27.9	100.0	100.0	100.0	100.0	2	0.59
100.0	100.0	100.0	100.0	100.0	100.0	4	24.55
50.0	22.6	87.5	97.5	100.0	100.0	8	7.34
37.0	34.1	74.1	61.3	92.6	90.9	27	31.96
26.3	94.4	84.2	6.4	94.7	6.9	19	93.60
47.1	32.2	76.5	49.7	64.7	68.5	17	36.17
100.0	100.0	100.0	100.0	100.0	100.0	1	0.36
0.0	0.0	100.0	100.0	75.0	48.5	4	6.60
43.7	**68.7**	**81.6**	**41.7**	**88.5**	**48.4**	**87**	**$203.28**

Source: ACIR, Characteristics of Federal Grant-in-Aid Programs to State and Local Governments, Grants Funded FY 1995, published June 1995; Executive Office of the President, Office of Management and Budget and U.S. General Services Administration, Update to the 1995 CFDA, December 1995.

Grant Allocations Not Targeted to Fiscally Stressed States

Given large and chronic federal budget deficits, some might argue that high rates of fiscal substitution are inappropriate because the federal government should not be collecting taxes on behalf of states only to return the funds in the form of unrestricted aid. Others might argue that this substitution serves the purpose of providing budgetary relief to the states. They might also prefer that the fiscal relief be allocated to more fiscally stressed states. These are policy questions that only the Congress can decide. If policymakers seek to target aid to fiscally stressed states, the question arises as to whether such aid is allocated to those states with relatively greater programmatic needs and fewer fiscal resources.

We examined whether existing federal grant allocations can be justified on the grounds that they provide budgetary relief to fiscally stressed states.[11] We found that, controlling for differences in programmatic needs, grant allocations to states were not significantly higher for states with relatively fewer fiscal resources. Specifically, the variable we used to measure fiscal capacity—total taxable resources—was not a statistically significant factor in targeting funds to lower-capacity states, controlling for

[11]Appendix IV contains a more detailed discussion of the model we used and our results.

differences in state (1) program needs, such as poverty, population under age 18, and highway miles, and (2) service costs.[12] In effect, this means that the current grant system does not help lower-capacity states provide levels of aided services comparable to higher-capacity states.

To illustrate the lack of a relationship between fiscal capacity and grant allocations, we ranked the states according to an index of their per capita federal grants, adjusted for costs, and calculated averages for five groups of 10 states each (quintiles). For example, a state with an average per capita grant would have an index value of 1.0. We found that state quintiles that ranked the lowest (0.85) and the highest (1.85) according to their grant allocations had similar average fiscal capacities.

We were unable to estimate accurately the effect of the individual need variables in our model on grant targeting. While three of the need variables were statistically significant, the results should not be used to draw conclusions about their relative importance. Reliability questions arose because—in contrast to fiscal capacity—there was no single or aggregate measure that accurately represented the program goals and objectives of all the grants we analyzed. Used in combination, however, the need variables provided a valid control to isolate the effect of needs from fiscal capacity on grant allocations.

Even so, our prior work on a wide range of individual grant programs suggests that need factors, in addition to costs and fiscal capacity factors, have not played an important role in allocating funds.[13] For example:

- The Community Development Block Grant program (CDBG) is intended principally to serve low and moderate-income communities and those with relatively greater community development needs. The CDBG formula uses poverty, age-of-housing, and community population growth rate statistical factors to allocate funds to meet those needs. However, while Greenwich, Connecticut, and Camden, New Jersey, are comparable with respect to the

[12]For this analysis, we included only closed-ended formula grants, which use formula factors to allocate aid. While 75 percent of grants rely on agency or legislative decisions—rather than formulas—to allocate funds for individual projects, the remaining formula grants comprise 85 percent of total grant funding. We excluded open-ended programs because the public finance literature notes that federal and state spending for such programs is designed to interact positively so that the more a state spends, the more the federal government spends. As a consequence, wealthier states can afford to spend more to leverage a larger share of total federal spending in programs such as Medicaid. Thus, for this analysis, including open-ended grant programs would have biased the estimated impact of the fiscal capacity variable. However, we previously testified that the Medicaid formula fails to target aid to states with the lowest fiscal capacities. See Medicaid Formula: Fairness Could Be Improved (GAO/T-HRD-91-5, December 7, 1990).

[13]See Related GAO Products for a complete list of GAO work on this issue.

age of their housing stock, Greenwich was allocated CDBG funds of $0.69 per person in poverty in 1995—over five times more than Camden's $0.13. Greenwich, with per capita income of $46,070, could more easily afford to fund its own community development needs than Camden, with per capita income of $7,276—about half the national average.[14]

- Funding shares for the four largest highway grant programs are determined by a complex, 13-step set of calculations, which provides funds for highway construction or maintenance needs, but subsequently adjusts the total funds designated for all four programs so that states receive their historical share of total funds. While individual calculations are made for three of the four separate programs, the funding for these programs is interdependent since a state's total share of funding for all four programs is fixed. This results in some states receiving more funds than would be provided if only need factors had been used.[15]
- The Older Americans Act grant formula distributes funds according to the number of people over 60 years of age, but does not take into account the fact that states with higher concentrations of elderly poor, minorities, and individuals over 85 years of age have higher disability rates.[16]
- The Ryan White Comprehensive AIDS Resources Emergency Act of 1990 double counts the number of cases residing in eligible metropolitan areas. Although recent legislative changes have reduced the double-counting, the needs indicators still favor more urbanized states. As a result, the oldest eligible metropolitan areas receive more generous funding, and newly emerging areas with more recent growth in AIDS cases receive less funding.[17]
- The Maternal and Child Health Block Grant directed more aid to states with lower concentrations of low-birthweight babies than to those with higher concentrations. Similarly, more aid was directed to some states with lower health care costs than to those with higher costs.[18]

[14]See Deficit Reduction: Opportunities to Address Long-Standing Government Performance Issues (GAO/T-OCG-95-6, September 13, 1995).

[15]See Highway Funding: Alternatives for Distributing Federal Funds (GAO/RCED-96-6, November 28, 1995).

[16]See Older Americans Act: Funding Formula Could Better Reflect State Needs (GAO/HEHS-94-41, May 12, 1994).

[17]See Ryan White Care Act of 1990: Opportunities to Enhance Funding Equity (GAO/HEHS-96-26, November 13, 1995).

[18]See Maternal and Child Health: Block Grant Funds Should Be Distributed More Equitably (GAO/HRD-92-5, April 2, 1992).

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Combination of Targeting Factors Not Generally Used

Most of the formula grants we reviewed did not use a combination of the three grant formula factors we have reported can improve targeting of federal aid. Nearly 95 percent of the 149 grant formulas we reviewed, representing 99 percent of formula grant funds, used a measure of need. However, only 15 percent of grant formulas, representing 61 percent of funds (7 percent excluding cash welfare and Medicaid), used both need and fiscal capacity factors. Finally, only 2 percent, representing less than 2 percent of funds, used a combination of need, fiscal capacity, and cost factors. As we noted earlier, where the federal government seeks a minimum or more comparable level of services for all potential beneficiaries—regardless of where they live—the inclusion of a fiscal capacity factor helps to reduce the disparities between the abilities of wealthier and poorer communities to provide such service levels. Cost factors help ensure that states facing higher service costs are compensated for these differences, which contributes to comparability in aided service levels.

The lack of targeting factors was not concentrated in any one budget function we reviewed. However, grants that have historically comprised the social safety net were more likely to include data elements that reflect fiscal capacity as well as need. About 24 percent of grants, representing 75 percent of funds (8 percent excluding cash welfare and Medicaid), in the education, income security, and health functions used need and fiscal capacity factors. Only 3 percent of grants in those functions (less than 2 percent of funds) also used a cost factor. In comparison, grants for other budget functions were less likely to use a combination of targeting factors. Notably, no grants in the natural resources, transportation, administration of justice, agriculture, community and regional development, veterans, or energy budget functions used fiscal capacity or cost factors in their formulas. Table 6 summarizes how the three targeting factors were combined in the 149 formula grants we reviewed, both in total and by budget function.

Table 6: Formula Grants With a Combination of Targeting Factors, by Budget Function, 1994

Budget function	Grants with targeting factor			Total grants	Percent of grants with combinations of targeting factors		
	Need	Fiscal capacity	Cost		Need	Need & fiscal capacity	Three factors combined
Education, training, employment, & social services	65	13	12	65	100.0	20.0	0.0
Income security	20	5	2	21	95.2	23.8	4.8
Health	9	5	2	11	81.8	45.5	18.2
Natural resources	13	0	0	14	92.9	0.0	0.0
Transportation	11	0	0	11	100.0	0.0	0.0
Administration of justice	6	0	0	6	100.0	0.0	0.0
Agriculture	5	0	0	5	100.0	0.0	0.0
Community & regional development	4	0	0	5	80.0	0.0	0.0
Veterans affairs	3	0	0	3	100.0	0.0	0.0
Energy	1	0	0	1	100.0	0.0	0.0
General government	4	0	2	7	57.1	0.0	0.0
Total grants	141	23	18	149	94.6	15.4	2.0
Safety net functions[a]	94	23	16	97	96.9	23.7	3.1

[a]Includes education, training, employment, and social services; income security; and health.

Source: Executive Office of the President, Office of Management and Budget, and U.S. General Services Administration, Update to the 1995 CFDA, December 1995.

The fact that a combination of the three targeting factors did not appear in most grant formulas, and fiscal capacity did not play a significant role in explaining the variation in grant funding to states, raises the logical question as to what factors did influence grant allocations. In this regard, the most significant as well as reliable explanatory variable in the grant targeting model was one that indicated whether or not a state was very small.[19] This variable was a proxy for states that benefit most from formula hold harmless provisions and guaranteed funding floors, which have the effect of providing a minimum grant to each state regardless of its size.[20] The results indicated that a very small state with average needs and

[19]Pertains to states with populations less than 0.25 percent of the nation's population.

[20]Many formula grant programs contain provisions that provide a minimum of funds to every state or hold states harmless from changes to formulas. Such programs first distribute grant funds to satisfy the minimum or hold harmless provisions. Only those funds remaining after the initial distribution are allocated based on formulas. Thus, smaller states will tend to have higher per capita grant allocations than larger states.

fiscal capacity would receive per capita grant funds 20 percent higher than a larger state with the same needs and fiscal capacity.

Finally, despite our finding that many grant formulas contained need factors and some contained fiscal capacity and/or cost factors, the measures used to allocate funds were often poor proxies for the three factors. For example, 28 of the 149 grant formulas we reviewed used a state's share of the U.S. population as a proxy for need. Generally, population is a poor proxy for program needs because when population is used funds are allocated to states in proportion to the number of people in the state, which is not necessarily the same as the number of people who actually need a particular program's services. Also, per capita personal income is a frequently used but poor proxy for fiscal capacity because it does not comprehensively measure state income. Specifically, it fails to capture income produced, but not received, in a state. Appendix V provides a more detailed discussion of the targeting problems that result when poor proxies of need, fiscal capacity, or cost are used.

Observations

Our analysis suggests that most grants are designed neither to reduce substitution nor to target funding to states with relatively greater programmatic needs and fewer fiscal resources. This is an indication that the federal government may be getting less fiscal impact than it could from the dollars it spends. Our literature synthesis implied that each additional federal grant dollar results in about 40 cents of added spending on the aided activity. This means that the fiscal impact of the remaining 60 cents is to free up state funds that otherwise would have been spent on that activity for other state programs or tax relief.

Grants are not the only type of federal subsidy tool in which design issues have undermined fiscal impact. Our prior work has shown that programs implemented through subsidies, such as loans and tax expenditures as well as grants, sometimes fall short of expectations because federal funds are transmitted through a network of third parties who have their own spending priorities or who would have undertaken subsidized activities anyway.[21]

Given the complex and evolving relationship between the federal and state governments and their shared responsibilities for most domestic programs, it is understandable that observers will have different views of

[21]For a summary of GAO reports on federal subsidies to businesses, see Budget Issues: Selected GAO Work on Federal Financial Support of Business (GAO/AIMD/GGD-96-87, March 7, 1996).

substitution. Some might see the substitution we identified as reasonable, given differences in state and federal priorities and a desire to provide states with managerial flexibility. As economists have shown, some substitution is to be expected whenever a grant is received—whether the funds go to an individual, an organization, or a state government. From the perspective of a recipient, the funds are simply additional income, to be used according to the recipient's own preferences, within the limitations imposed by the grant. This is why a grant's design together with the degree of state commitment to federal priorities determine the ultimate fiscal impact of federal grant dollars. Also, in our federal system the balance of domestic responsibilities may be shifting toward the states. Thus, providing states with a measure of fiscal relief, albeit indirectly, could be considered a legitimate role for the federal grant system.

Others might argue that if the provision of fiscal relief is to be the primary goal of the federal grant system, then this relief should be allocated in a manner that allows for adequate oversight and control by the Congress. If fiscal relief is accepted as a policy goal, there are a variety of alternatives available to the Congress to allocate this relief. The alternative we examined would target the relief to states with greater programmatic needs and fewer fiscal resources. Our analysis showed that existing grant formulas do not allocate federal aid to states in a targeted manner. This may have occurred because grant formulas or eligibility rules were constructed too broadly, grant floors and ceilings allocated funds too widely, or the circumstances that created a need for the program may have changed.

Notwithstanding the importance policymakers may place on providing states with fiscal relief, the question remains as to whether the federal government can afford this approach and still accomplish objectives of national importance in an era of increasingly scarce federal resources. The issues we have raised concerning grants are part of a larger problem of how to improve government performance concurrent with downsizing. A focus on cost-effectiveness will be especially important as agencies implement the Government Performance and Results Act of 1993, thus turning the federal government's focus to outcome-based measures of grant performance. As a consequence, it will be increasingly important to design grant programs so that the federal dollars needed to produce desired outcomes reach their intended targets.

Moreover, substitution raises questions about the federal role in the federal system. In many cases, the federal government created grant

programs because of the view that states were not funding certain services to a degree consistent with national, rather than purely local, policy objectives. However, the difference in priorities that provides the rationale for such grants also makes it more likely that states will attempt to use grant dollars to replace their own funds, thus converting specific-purpose aid to general fiscal relief. While the federal government may still wish to pursue national objectives in these areas, it should be recognized that, because of substitution, such objectives may be costly to achieve.

The potential for substitution may increase when the federal government chooses to finance areas in which state spending is already significant. Historically, initial federal involvement in funding state spending in an area may have occurred when little or no state funds were being committed, thus prompting states to commit resources for the first time. But as states' commitment to funding those areas has grown over time, or the federal government has chosen to enter an area where state spending has traditionally been large, the potential for substitution may have grown as well.

There are many factors that must be reconciled in considering the budgetary implications of grant design. Taking one path, the Congress could consider redesigning grants to reduce substitution and increase targeting. For example, to reduce substitution and increase the likelihood that federal grant funds lead to greater total spending on aided programs, greater use of state matching, with reduced federal shares, and maintenance-of-effort provisions that track inflation and program growth can be considered. However, as previously noted, policymakers would need to consider the potential losses in state spending flexibility that could occur as a result of adding spending restrictions. Also, if formula grants were redesigned to include a combination of targeting factors, a larger share of federal aid could be allocated to those states and communities with relatively greater programmatic needs and fewer fiscal resources. We recently reported that greater targeting of grant formulas offers a strategy to bring down federal outlays by concentrating reductions on jurisdictions with relatively fewer needs and greater fiscal capacity to absorb cuts.[22]

Taking a different path, the Congress could use information about the relative performance of grant programs to consider which programs may have outlived their usefulness. The Congress may decide that the benefits of particular programs are not being achieved in a cost-effective manner

[22]Addressing the Deficit: Updating the Budgetary Implications of Selected GAO Work (GAO/OCG-96-5, June 28, 1996), p. 207.

due to substitution and a lack of targeting. Accordingly, the Congress may decide that such programs no longer represent the best use of scarce federal resources. Targeted reductions based on the relative performance of federal programs can help promote a government whose responsibilities are better matched to the resources available. Such reductions could be used either to cut the deficit or invest in other federal programs that the Congress judges to be more cost-effective. However, because the evidence on whether states would replace reductions in federal grant funds is inconclusive, and because replacing federal funds would mean reductions to other state programs or increases in state taxes, the Congress would need to consider the costs and benefits of individual programs carefully in selecting which programs to reduce or eliminate.

As arranged with the Committee, we are sending copies of this report to the Director of the Office of Management and Budget, cognizant congressional committees, and other interested parties. We will also make copies available to others upon request.

The major contributors to this report are listed in appendix VI. If you have any questions, please call me at (202) 512-9573.

Sincerely yours,

Paul L. Posner

Paul L. Posner
Director, Budget Issues

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Abbreviations

ACIR	Advisory Commission on Intergovernmental Relations
CDBG	Community Development Block Grant
CFDA	Catalog of Federal Domestic Assistance
FMAP	federal medical assistance percentage
GSA	General Services Administration
GSP	gross state product
MCH	Maternal and Child Health
MOE	maintenance-of-effort
OLS	ordinary least squares
PCI	per capita personal income
TTR	total taxable resources

The Role of Grants in the Federal System

Federal grants have historically served as vehicles through which the federal government attempted to achieve a variety of national goals by providing funding to other levels of government to carry out specific federal policies. In particular, economists have cited the role federal grants play in encouraging state and local governments to provide more of the public goods and services deemed beneficial from a national—rather than a purely state—perspective.[1]

Spending on Public Goods

From the perspective of economic theory, federal grants can play an important role in stimulating spending in areas where public benefits or costs cross jurisdictional lines. The problems addressed by the grant system in these types of situations are termed positive and negative externalities, respectively. When a jurisdiction does not receive—that is, consume—all the benefit from a public good it produces because some of the benefit accrues to non-residents, the jurisdiction has little incentive to produce the good in sufficient supply to meet society's total demand. According to this logic, taxpayers from a sparsely populated state would likely be unwilling to spend their scarce tax dollars to construct and maintain highways in their state large enough to support private and commercial traffic from other states. If other states followed the same thinking, the highway system would be inadequate from a national standpoint because state taxpayers do not share the benefits that accrue to non-residents traveling through their states. Because individual states are unlikely to supply the quantity and quality of interstate highways demanded by interstate travelers, federal grants to states for the construction and maintenance of highways can be used to induce the states to fulfill this need.

Reducing Disparities in State Capacities to Provide Minimum Services

Economists also argue that federal grants can play a role in distributing income to communities with higher social service needs and smaller tax bases. Some states have higher concentrations of poor people or other service populations and smaller tax bases with which to pay for their own service needs. Accordingly, significant disparities can arise either in the level of services states provide or in the tax burdens states incur to provide a given level of services. Some experts suggest that such fiscal disparities across states argue for a federal role in helping states with greater needs.

[1]In this appendix, we use state to mean state and local governments and/or their agencies.

Federal grants can satisfy this objective by allocating aid to states through formulas that provide relatively greater funding to states with higher needs and lower fiscal capacities, such as occurs with Medicaid. Or, according to the logic of the General Revenue Sharing program,[2] they can provide broad funding designed primarily to reduce disparities in fiscal capacities across communities.

Funding Meritorious Goods

Another goal for federal grants is supporting state spending on goods that are deemed meritorious from a national perspective and should therefore be available to all. Unlike redistributive grants, grants for merit goods tend to be for specific categories of goods, such as the arts, gifted and talented educational programs, or assisted housing.

Other Roles Federal Grants Play

Federal grants have played a variety of roles beyond those most frequently cited by economists. Increasingly, grants have become a vehicle for implementing the federal government's regulatory agenda at the state and local level. By attaching conditions to aid, the federal government has sought to achieve a variety of goals, such as reduced discrimination, increased highway safety, reduced energy consumption, and reduced pollution. Economists have also argued that federal grants, such as unemployment insurance, can play a role in stabilizing economic swings that occur at the state and local levels during recessions, when demand for public services rise as revenues decline. The public administration perspective has shifted in recent years to include a more business-like approach to intergovernmental aid. For example, some have argued that grant awards should be provided in a competitive manner based in part on whether a recipient achieves performance goals. Finally, states have been increasingly vocal about the need for federal grants with fewer restrictions on how funds are to be spent so that the state can address the unique needs of its citizens and provide quality and cost-effective services.

[2]The General Revenue Sharing program, which ended in 1986, used the federal government's tax collecting capabilities to redistribute national income to communities with relatively lower fiscal capacities.

Scope and Methodology

This report examines the extent to which the federal grant system succeeds in two fiscal objectives often cited by public finance experts. First, do grants succeed in encouraging states to use federal dollars to supplement rather than replace their own spending on nationally important activities? The use of federal grant dollars to replace a state's own spending is frequently referred to as substitution. Second, do grants succeed in reducing differences—or mismatches—between states' fiscal resources and programmatic needs?[1] This appendix details the scope and methodology we used to answer these questions.

Substitution Analysis

To address substitution, we (1) synthesized the published economic and political science literature regarding the influence of federal grants on state spending, (2) identified dimensions of grant design that influence the extent of substitution, and (3) evaluated the quantitative estimates of the fiscal impact of federal grant spending reported in the literature. To identify the universe of grant programs and catalog their design features and other characteristics necessary for our analysis, we used information from the Catalog of Federal Domestic Assistance, reports by the Advisory Commission on Intergovernmental Relations, the United States Code Annotated, and the United States Code of Federal Regulations. The 633 grants we identified represented the total of grants available to state governments in fiscal year 1994.

The Influence of Grant Design on Substitution

One part of our analysis focused on the theory underlying the influence of grants on state spending decisions. We began with five summary reviews of the literature,[2] and, because the last of these was published in 1985, we also searched computerized indexes for more recent studies.[3] From this body of work, we identified three dimensions of grant design that influence the impact of federal grants on state spending:

- whether a grant was unrestricted or restricted to a specific purpose,
- whether or not a state contribution was required—either in the form of matching federal payments or maintaining the level of fiscal effort that existed prior to the grant, or

[1]In this appendix, we use state to mean state and local governments and/or their agencies.

[2]Advisory Commission on Intergovernmental Relations (1977), Barro (1978), Gramlich (1977), and U.S. Department of the Treasury (1978 and 1985).

[3]The following computer indexes were searched for the period 1980 to the present: Journal of Economic Literature, Congressional Research Service, Library of Congress, Business Periodicals Ondisc, and National Technical Information Service.

- whether or not there were ceilings on the total the federal government would pay out on matching grants.[4]

We also identified articles that provided information on grant impact for different service areas, such as education, health and hospitals, highways, social services, and welfare. We collected this information to determine whether grants for different service areas had different impacts, apart from the impacts associated with different grant designs.

Next, we identified articles containing quantitative estimates of the impact of federal grants on state spending and assembled the information in a database.[5] Each observation in the database was an estimate from a study, some studies providing multiple estimates. For each observation, we recorded key information from the study (e.g., author, date, sample type, model used, grant impact estimates, statistical significance of the estimates, potential biases, and estimated price or income elasticities). When studies provided information about the grant design features or functional categories of spending, we also recorded that information, including (1) grant form (categorical, block, unrestricted, or all), (2) matching or non-matching, (3) open-ended or closed-ended, (4) the presence/absence of maintenance-of-effort (MOE) provisions, and (5) grant service area (all, welfare, highway, education, health/hospital, or social services).

Using this database, we compared the reported estimates of grant impact for (1) studies completed during different time periods, (2) studies using different sample types, (3) grants with different designs, and (4) grants for different service areas.

First we calculated the mean, the median, and the 25th and 75th percentile observations (the mid-range) of all the estimates in our database.[6] Then we extracted subsets of the database that contained the grant design features we were assessing. For example, to summarize the estimated expenditure impact of grants characterized as "matching," we extracted all records for

[4]As stated in the literature, a grant recipient's preferences for spending on the aided-good versus other goods would influence their responsiveness to those grant design features. Appendix III contains a more detailed explanation of how grant design features combined with a recipient jurisdiction's preferences can influence spending.

[5]We excluded state grant impact estimates from our review because of concern that they were not comparable to federal grant impact estimates.

[6]The database contained some very low and very high observations that tended to provide a skewed picture of the results. Calculating the mid-range eliminated the highest and lowest 25 percent of observations and provided a better measure of the central tendency of the data.

which the "matching" field contained a "yes" and calculated the same descriptive statistics. We compared the results for matching grants to non-matching grants, open-ended to closed-ended, etc.[7] Table II.1 summarizes the results for the different time periods, grant design features, and sample types we analyzed.

Table II.1: Summary of Econometric Estimates of the Impact of an Additional Dollar of Federal Grants on Total Spending for Aided Activities

	Impact of $1 in federal grants on total spending[a]	Mid-range of estimates		(Substitution) or increase implied by estimate[b]	Number of estimates
		25th percentile	75th percentile		
All estimates	$1.05	$0.45	$1.58	$0.05	109
By time period[c]					
Pre-1968	1.41	1.16	1.94	0.41	25
1968-1977	1.17	0.69	1.62	0.17	47
1978-on	0.42	0.26	0.89	(0.58)	37
By design feature[d]					
Open-ended	1.38	0.71	1.74	0.38	15
Closed-ended	0.54	0.37	1.04	(0.46)	8
Matching	0.85	0.33	1.14	(0.15)	24
Non-matching	0.42	0.25	0.50	(0.58)	13
By sample type					
Cross-section[e]	1.41	1.04	1.81	0.41	57
Time series[f]	0.33	0.27	0.44	(0.67)	15
Pooled[g]	$0.73	$0.37	$1.07	$(0.27)	37

[a]Calculated as the median (middle) estimate of all the estimates we examined.

[b]Calculated by subtracting $1.00 in federal grants from the median grant impact estimate.

[c]The year a study containing an estimate was published. The periods of state and local spending examined in the studies ranged from 1942 to 1990, but centered on the 1960s to the 1970s.

[d]Across all time periods. Only two estimates were characterized as pertaining to unrestricted grants and only one as pertaining to grants with maintenance-of-effort. Therefore, we did not include those results as separate subsets.

[e]One year of data across all states.

[f]Aggregate state data across multiple time periods.

[g]Data across all states for more than one time period.

Source: Studies listed in bibliography.

[7]The estimates varied greatly within each category and, like all preceding surveys of the grant literature, we did not test whether the differences in impact estimates between grant categories were statistically significant. Nonetheless, the medians and mid-ranges of the category estimates had the relative magnitudes suggested by theory.

Similar to the aggregate results in the table, estimates of federal grant impact by service area were generally higher in earlier periods of study and lower in more recent years. Because our analysis did not provide support for any differences in the expenditure impact of grants across different service areas, or apart from the other features we examined, we did not report those results.

Analysis of Grants for Features Associated With Substitution

To assess whether grants contained the design features associated with substitution, we developed a second database of the 633 grants available to states in fiscal year 1995. We obtained the data from an 1995 Advisory Commission on Intergovernmental Relations (ACIR) study of the federal grant system, entitled Characteristics of Federal Grant-in-Aid Programs.[8] This study provided summary information on the matching rates and the open-ended versus closed-ended status of individual grant programs.[9] ACIR also provided us with additional unpublished support schedules identifying grants that contained MOE provisions. ACIR's data did not include spending information for each grant. Therefore, we obtained fiscal year 1994 estimated obligations for each grant from the electronic version of the 1994 CFDA database.[10]

We sorted and tallied all 633 grants as well as the largest 87 grants, representing 95 percent of grant funds, and their obligations according to whether they were (1) matching, (2) closed-ended, and (3) had MOE provisions. For matching grants, we also tallied those with federal shares greater than 50 percent. We compared these counts and sums to the total for the database or for the largest 87 grants.

MOE provisions are more effective when they are designed to maintain state fiscal effort at a level that keeps pace with inflation and program population growth. To determine whether MOE provisions in grants are

[8]The source of the ACIR data was the 1994 Catalog of Federal Domestic Assistance (CFDA). The CFDA is a governmentwide compendium of federal programs, projects, services, and activities that provide assistance or benefits to the American public that is compiled by the General Services Administration (GSA). Agency program managers provide GSA with information for the catalog. The catalog is available in both hard copy and in an electronic database format.

[9]ACIR described a grant's matching rate in terms of the federal share of spending. ACIR also characterized some grants as having multiple matching rates. Therefore, in our database we recorded federal matching shares using the following categories: at least 50 percent (i.e., federal matching shares of between 50 percent and 100 percent), at least 75 percent, or 100 percent.

[10]Neither actual 1994 obligations nor more recent estimates were available to us in electronic format at the time of our review. Because we sought to determine order of magnitude differences in obligations among categories of grants, rather than precise budgetary information about any individual grant, we chose to rely on CFDA's estimated obligations.

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designed this way, we searched the CFDA database for grants that contained MOE provisions. Of the 28 programs we found, we examined only closed-ended programs because the matching rates that drive state contributions for open-ended programs would override the influence of an MOE provision. We ranked the closed-ended programs by their funding and selected for review the eight largest, constituting 92 percent of the funding for those programs.[11]

To ensure that MOE provisions for the eight grants we reviewed were up-to-date, we cross-referenced the public laws and their amendments to the relevant United States Code Annotated and/or the United States Code of Federal Regulations. We then analyzed the MOE provisions to determine what they entailed and whether they accounted for inflation or program population growth.

Targeting Analysis

To address targeting, we reviewed an extensive body of GAO case studies of formula grant programs and conducted our own aggregate analysis. For one part of the aggregate analysis we used a multivariate regression model to quantify the extent of targeting in the overall grant system. This model and its results are presented in appendix IV.

For the other part of the aggregate analysis, we created a database of the 149 formula grants compiled from the 1994 CFDA. This database included information on whether a grant contained any of the three grant design features GAO has reported can target grants to jurisdictions with relatively greater disparities between fiscal resources and programmatic needs. These are fiscal capacity, cost differentials, and indicators of program needs.[12] To clarify certain CFDA data or obtain missing information, we interviewed agency officials and searched relevant portions of the U.S. code. We sorted and tallied the database according to the three targeting factors for all the grants and within 12 budget functions, and we calculated the share of formula grant programs containing the individual factors and the factors in combination.

This part of our analysis was limited to the universe of 149 formula grants, representing 85 percent of federal grant funds to states in fiscal year 1994.

[11]The eight programs we reviewed were: Chapter 1 Grants to Local Educational Agencies; Special Education Grants to States; Rehabilitation Services: Vocational Rehabilitation Grants to States; Vocational Education: Basic Grants to States; Senior Community Service Employment; Special Programs for Aging (Title III, Part B Grants); Community Mental Health Services Block Grant; and Adult Education: State Administered Basic Grant Programs.

[12]See appendix V for a detailed discussion of the three targeting design features.

Project grants—comprising most other federal grant spending—also could be examined from a targeting perspective. However, that analysis would have required us to determine whether agency funding decisions reflected differences in competing grant applicants' fiscal capacities, program needs, and service costs. Moreover, funding decisions for project grants apply only to individual project applications, thereby limiting our ability to generalize from such decisions. In contrast, formula grants allocate funds according to a prescribed formula and are of a continuing nature. Therefore, our analysis of formula grant targeting could be limited to a relatively straightforward analysis of grant allocation formulas for the three targeting features we identified.

Because your question concerned grants that funded programs, we excluded grants that exclusively funded administrative and/or planning activities. Further, we eliminated grants paid to states in lieu of real estate taxes owed on federal property located in a grantee's jurisdiction because targeting factors are not relevant criteria for allocating such grant funds.

We performed this review in accordance with generally accepted government auditing standards. We conducted our review from June 1995 through June 1996.

Grant Design Features Intended to Increase Spending in Nationally Important Areas

In this report we discussed three grant design features that are related to substitution. This appendix discusses these features from an economic theory perspective. First, we provide an overview of the grant spending impacts that are predicted from the framework of the general consumer demand model. Thereafter, we review how the individual features work in theory either to stimulate state spending or increase substitution.[1]

Economic Theory Predicts Impact of Grant Design Features

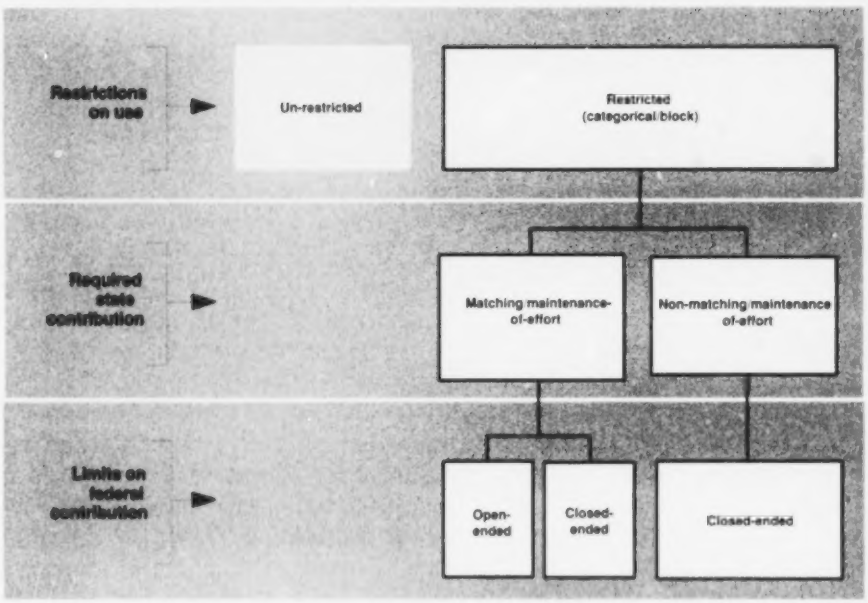
Over the past 30 years, economists have adapted general consumer demand theory to model how a government's expenditure patterns are likely to change in response to a grant. In that theory consumers are assumed to maximize their individual welfare subject to their preferences for the goods and services available to them, the prices they must pay for the goods, and the resources they have to spend. Thus, for grants, the model depicts a government which may "purchase" (1) goods aided by a grant, (2) all other public or private goods,[2] (3) or some combination. The quantity of goods the government can purchase is constrained by a budget consisting of its own revenues plus additional revenue from federal grants. The model demonstrates how the government would purchase as much of the aided and non-aided goods it could afford, within its budget constraint in accordance with the taxpayers' collective preferences. How much more of an aided good a government purchases using its additional grant income depends on two factors: (1) taxpayers' preferences for the aided good relative to other goods the government could purchase with the additional resources and (2) the incentives to purchase aided rather than non-aided goods that are built into the grant.

According to economic theory, there are three types of incentives that can be used to encourage grant recipients to increase total spending on aided goods. As shown in figure III.1, the incentives work by restricting the use of funds to specified purposes, requiring recipients to contribute their own funds to obtain grant funds, and/or providing unrestricted federal matching of state funds.

[1] In this appendix, we use state to mean state and local governments and/or their agencies.

[2] A government can purchase private goods by lowering taxes and thereby providing residents more disposable income.

Figure III.1: Grant Design Features Along Three Dimensions



The theory also states that the effectiveness of these incentives also depends on the budget priorities of state taxpayers. For example, if a community does not share federal priorities for spending on pollution control, the federal government may have to build into the grant more restrictions or incentives than if federal and community priorities were better aligned.

Grant Design Features That Restrict Use of Funds

Among the various types of federal grants, unrestricted grants do not stipulate what grant funds must be spent on and therefore provide the most discretion to recipient governments. Unrestricted grants—also known as unconditional or general-purpose grants—are pure income transfers from the federal government to recipients that do not stipulate what grant funds must be spent on or require any contributions from recipients' own funds. Such grants provide the most discretion to recipient governments. The General Revenue Sharing program of the 1970s and 1980s is an example of an unrestricted grant. The program provided funds that could be used for virtually any governmental purpose.

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In theory, unrestricted grants are intended to help overcome geographical inequalities in fiscal well-being, rather than stimulate public spending for specific purposes. To achieve this objective, an unrestricted grant would provide more funds to jurisdictions with relatively low tax bases and high needs for public services and fewer funds to more fiscally sound jurisdictions.

In contrast, conditional grants limit recipient discretion through restrictions designed around program goals, some of which are broader than others. Both categorical grants and block grants are considered conditional. However, while categorical grants feature narrowly-prescribed objectives, block grants authorize funds to be used for a wide range of activities within broadly-defined functional areas.[3]

Economic theory holds that conditional grants encourage more total spending on grant activities than unrestricted grants, and that unrestricted aid is more likely to be used for tax relief. To understand why this is so, consider the different spending responses of recipients to a gift certificate from a sporting goods store compared to an equivalent amount of cash. A gift certificate that exceeds the amount recipients normally would spend on sporting goods will tend to boost their total spending on sporting goods. With cash, they are likely to spend each additional dollar of income according to their preferences for all goods. Spending on sporting goods could be a small share of each additional dollar, such as 5 cents.

In reality, communities receive federal grant dollars, not gift certificates, and these dollars are fungible with other community resources. For this reason, economists have concluded that grant recipients rarely are wholly constrained by the legal conditions attached to a grant. Rather, there will likely be an element of substitution in every grant as recipients find ways to replace their own funds with federal funds, freeing up local resources for other purposes. Overall, economic theory recognizes that $1 in conditional grants will not necessarily result in an additional dollar of state spending on the grant activity.

Substitution also occurs when a community may have planned to spend more of its own resources on a particular purpose, even without a grant. In such cases, a conditional grant simply increases the budget available to the community and becomes, in effect, added income similar to the income provided through an unconditional grant. In this situation a community can substitute some or all of its conditional grant funds for other purposes,

[3]Block Grants: Issues in Designing Accountability Provisions (GAO/AIMD-95-226, September 1, 1995).

including tax relief. To extend the gift certificate analogy, the holder may have been planning to buy sports equipment before receiving the certificate. Because the gift certificate can replace the cash the holder was planning to spend on sporting goods, the holder has, in effect, received a grant of additional income that can be used for purposes unrelated to sports. A sports enthusiast may add the certificate to what she was planning to spend on sporting goods; someone else with less enthusiasm for sports may use the gift certificate to replace all of his planned spending.

Grant Design Features That Require State Contributions

Some federal grants include matching provisions that require states to share the cost of providing the aided service with the federal government. For example, a matching grant may require states to spend 50 cents from their own revenue sources for each dollar of federal funds provided. Thus, 50 cents in state spending on a matching program yields $1.50 in program funds. Non-matching grants, in contrast, provide funds to recipients without any requirement for state cost-sharing.

According to economists, matching grants encourage more state spending on aided goods that non-matching grants, other factors being equal. Both matching and non-matching grants provide additional income to recipient governments. Because grant funds are partially fungible, this income, like any other type of income, permits recipients to consume more of both aided as well as non-aided activities according to their preferences. However, matching grants, in addition to providing additional income, also lower the "price" to the recipient government of the aided good relative to the other goods it could purchase with the funds. For example, with federal matching of 75 percent of total spending, a state could spend 25 cents on an aided good and obtain 75 cents in federal funds, for a total maximum increase in spending of $1. Without matching, another dollar of spending on an aided good still costs a dollar. Therefore, the same federal subsidy of 75 cents yields a maximum of only 75 cents of total additional spending.

How effective a matching grant will be in increasing a recipient's spending depends on the recipient's preferences for aided versus non-aided activities (including tax relief). If a recipient wants more of an aided activity, such as a computer education program, the price effect may produce a strong spending response. For activities the recipient desires less, the price effect may be less. In the extreme, if the recipient does not want more of an aided activity, the price effect will be negligible.

The use of maintenance-of-effort provisions can help make up for the lack of a price effect in non-matching grants by requiring states to continue a designated spending level from their own sources in order to receive the federal assistance. Because states must maintain a prescribed level of spending, their ability to substitute federal funds for their own is limited. Over time, however, increases in the population served by the program, inflation, and other determinants may cause federal spending for the program to rise. Therefore, to retain its effectiveness as an incentive for states to contribute their own funds, a maintenance-of-effort provision should contain adjustment mechanisms so that required state contributions keep pace with such trends.

Grant Design Features That Limit Federal Contributions

For most federal matching grants, the federal share of total spending is limited to a fixed amount or ceiling. Such grants are considered "closed-ended." Thus, any state spending beyond the amount needed to obtain the maximum of federal funds occurs without any incentive in the form of a price reduction resulting from the federal match.

Closed-ended grants may also contain maintenance-of-effort provisions, which require state or local governments to maintain a prescribed level of expenditures from their own sources on the aided function. In theory, maintenance-of-effort provisions have an impact similar to a matching requirement since the recipient must continue to spend from its own resources on the aided function at a required level to receive additional federal aid.

For a few federal matching grants, the federal share of program spending is unlimited—or "open-ended." Open-ended grants consist primarily of a few large entitlement programs, such as Medicaid and Foster Care. The federal government has limited control over the amount of spending on open-ended grant programs, mainly through variations in the strictness of the grant eligibility requirements.

According to economists, a closed-ended matching grant will be as stimulative as an open-ended matching grant as long as state spending on the aided activity remains below the level needed to obtain the maximum federal contribution. In this case, a closed-ended grant has the same stimulative income and price effects as described for a matching grant. However, the fiscal impact of a closed-ended grant will be different when state spending on the grant activity is above the federal grant ceiling. In this situation, the price reduction created by federal matching is

eliminated for the additional spending beyond the limit of the federal contribution. Therefore, the grant has only an income effect, and grant funds simply add to the total resources of the community with an effect equivalent to an unconditional grant. The community can substitute part or all of the grant funds for its own spending and has full discretion over the use of the freed-up resources. As previously described, effective maintenance-of-effort provisions, which track inflation and program growth, can make up for the loss of the price incentive for a closed-ended, matching grants when spending is beyond the federal limit.

Statistical Analysis of Federal Grant Targeting

As part of our targeting analysis, we sought to determine if current federal grant formulas allocate funds in a manner that targets states with greater mismatches between programmatic needs and fiscal resources. To do this, we developed a grant targeting model, we modified the model to reflect the influence of funding floors and hold harmless formula provisions, and we tested the model using a statistical technique known as multiple regression.[1] The regression analysis enabled us to estimate the influence of state fiscal capacity, apart from the influence of the other independent variables, on per capita federal grant allocations to the 50 states. We found that, after controlling for indicators of program needs, such as poverty, population under age 18, and highway miles, and for service cost differentials, fiscal capacity did not play a statistically significant role in allocating aid to states. In fact, the most significant variable in the model was a proxy for the presence of funding floors and hold harmless provisions in grant formulas.

The remainder of this appendix discusses, in technical detail (1) the theory that provided the basis for our analysis and the specification of a grant allocation model suitable for estimation using multiple regression, (2) the data we used to estimate the grant targeting model, and (3) the results of our analysis.

Model Specification

In theory,[2] targeted grants should correct for differences in the fiscal conditions of state governments so that taxpayers in less wealthy states can provide comparable services at comparable tax rates to wealthier states. Under the theory of grant targeting, a state's fiscal condition can be described in terms of expenditure needs compared to revenues. Technically, this is defined as the gap between the revenues that can be raised from local sources with an average tax burden on local residents

[1]For this analysis, we included only formula grants, which use formula factors to allocate aid. We also excluded open-ended programs because the public finance literature notes that federal and state spending for such programs is designed to interact positively so that the more a state spends, the more the federal government spends. As a consequence, wealthier states can afford to spend more to leverage a larger share of total federal spending in programs such as Medicaid. Thus, including open-ended grant programs would have biased the estimated impact of the fiscal capacity variable.

[2]This theory is found in public finance literature. See, for example, Katherine L. Bradbury, Helen F. Ladd, Mark Perrault, Andrew Reschovsky, and John Yinger, "State Aid to Offset Fiscal Disparities Across Communities," National Tax Journal Vol. 37, No. 2, (June 1984), pp. 151-170; Robert M. Stein and Keith E. Hamm, "A Comparative Analysis of the Targeting Capacity of State and Federal Intergovernmental Aid Allocations: 1977, 1982," Social Science Quarterly Vol. 68, No. 3 (Sept. 1987), pp. 447-465. For applications to federal grant programs, see Maternal and Child Health: Block Grant Funds Should be Distributed More Equitably (GAO/HRD-92-5, April 2, 1992) and Older American Act: Funding Formula Could Better Reflect State Needs (GAO/HEHS-94-41, May 12, 1994).

(i.e., fiscal capacity) and the expenditures required to finance an average level of public services (i.e., needs).

States with positive gaps are regarded as being in better fiscal condition to provide services than those with negative gaps. States with average fiscal capacities and average service needs are in the middle. In a theoretical redistribution scheme, states with positive gaps would transfer resources to those with negative gaps through an unconditional grant or transfer of funds.

In practice, grants are allocated from a general fund at the federal level and distributed to eligible states for particular purposes according to a formula. The design of a grant targeting formula will depend on the type and degree of equity desired. There are two types of equity policymakers can consider—beneficiary equity and taxpayer equity. To achieve beneficiary equity, grant funds would need to be allocated in proportion to each state's potential program needs and adjusted for differences in service costs. Achieving taxpayer equity requires considering fiscal capacity in addition to the needs and cost factors used to achieve beneficiary equity.

Beneficiary and taxpayer equity cannot be achieved simultaneously. Maximizing beneficiary equity provides equal federal funding per beneficiary, resulting in unequal taxpayer burdens across states. Maximizing taxpayer equity equalizes state taxpayer burdens, resulting in unequal federal funding per beneficiary. Another equity goal falls between achieving either full taxpayer or full beneficiary equity, whereby differences in state taxpayer burdens are reduced but not totally eliminated by allowing some differences in funding per beneficiary across states. In prior work we referred to this goal as "balanced equity." The model in figure IV.1—which we refer to as the grant targeting model—incorporates the need, cost, and fiscal capacity factors, consistent with achieving balanced equity.

Figure IV.1: Grant Targeting Model

$$\frac{G}{C} = \beta_0 + \sum \beta_{1_j} * Need_j - \beta_2 * \frac{FC}{C}$$

where

G = per capita grant allocation
β_0 = constant
$Need_j$ = program need indicators, such as poverty rates, population of school age children, unemployment rates, etc.
$\beta_{1,2}$ = coefficients representing the relative influence of each need indicator and the fiscal capacity indicator on the grant allocation
FC = per capita fiscal capacity
C = cost of public services subsidized by federal grants

According to the grant targeting model, the dependent variable is per capita grant allocations to states, adjusted for costs (G/C). The independent variables are a variety of state program need indicators ($Need_j$) and state per capita fiscal capacity, also adjusted for costs (FC/C). The hypothesis implied by the model is that the dependent variable, G/C, would be a positive function of need; i.e., states with greater needs should receive larger per capita grants. In contrast, the model implies that the dependent variable would be a negative function of fiscal capacity; i.e., states with greater resources to provide program services on their own would receive smaller per capita grants.

Our objective for estimating the grant targeting model was to determine the extent to which the fiscal capacity variable explained the variation in the allocation of federal funds to states, controlling for a variety of plausible indicators of state program needs and cost differentials. Therefore, we tested the hypothesis that the fiscal capacity variable would have the predicted negative sign and be statistically significant. We included the need indicators primarily as control variables that would enable us to more accurately assess the impact and significance of the fiscal capacity variable.

Our ability to accurately estimate the impact of the model's need factors on aggregate grant allocations was limited. In contrast to the fiscal capacity variable, there is no single or aggregate measure that accurately represents the program goals and objectives of all the grants in the system.

Therefore, it was difficult to determine the effects an individual needs indicator, such as the school age population, had on the allocation of aggregate grant funds. Because each grant program uses a unique set of factors to allocate funds, a particular need indicator used to distribute funds for one program may play no role in other programs. Consequently, in estimating the influence of a variety of need indicators on aggregate grants allocations, the effects of the need indicators may, to a certain extent, cancel one another out. Thus, the statistical significance or insignificance of a particular need indicator in this analysis does not provide an adequate basis for drawing conclusions about its relative importance in the allocation of federal grants. However, used in combination, the need variables provided a valid control to isolate the effect of needs from that of fiscal capacity on aggregate grant allocations.

The grant targeting model describes the allocation of grant funds as a function solely of state needs and fiscal capacities, adjusted for costs. However, many grants contain funding floors and hold-harmless provisions that guarantee each state a minimum grant allocation, regardless of their needs and fiscal capacities. This has the effect of providing smaller states greater per capita grant allocations than larger states. Therefore, in specifying the model, we created two dummy variables representing very small states (those with populations less than .25 percent of the total United States population), and small states (those with populations between .25 percent and .5 percent) to serve as proxies for the influence of funding floors and hold-harmless provisions on grant allocations.[3]

When two variables have a joint effect over and above the effects of each factor separately it is considered "interaction." Given the presence of funding floors in most federal grant formulas, we thought it likely that one or both of the dummy variables would be statistically significant. Therefore, to test whether the effect of fiscal capacity was significantly different for the smaller states, we included interaction terms to provide separate fiscal capacity coefficients for very small, small, and all other states.

We also deflated the two fiscal variables, per capita grant allocation and fiscal capacity, by an input-cost index to control for the different costs states face in providing program services.[4] Finally, all variables were constructed as indexes, having weighted average values of 1.0. Measuring

[3]Grant allocations to these states represented 5.8 percent of the total for the United States.

[4]We used a general wage-rental input cost index.

all variables as indexes allowed the regression coefficients in the statistical model to be interpreted as elasticities (i.e., the percent change in the dependent variable—per capita grant allocation—in response to a 1 percent increase in an independent variable from its mean value). This facilitated the interpretation and reporting of results and minimized problems of multicollinearity among the independent variables. Figure IV.2 shows our specification of the grant targeting model.

Figure IV.2: Specification of the Grant Targeting Model

$$\frac{g}{cg} = \beta_0 + \sum \beta_{1_j} * Need_j - \beta_2 * \frac{y}{c\bar{y}} + \beta_3 * D1 + \beta_4 * D2 + \beta_5 * \frac{D1y}{c\bar{y}} + \beta_6 * \frac{D2y}{c\bar{y}}$$

where

g/cg = per capita grant index adjusted for differences in costs
β_0 = constant
$\beta_{i=1..6}$ = coefficients representing the influence of each independent variable on the grant allocation
$Need_j$ = per capita need indicators expressed as indexes relative to the national average
y/cy = per capita fiscal capacity index adjusted for differences in costs
D1 = dummy variable representing states with populations less than .25 percent of the United States population
D2 = dummy variable representing states with populations between .25 percent and .50 percent of the United States population
D1y/cy = interaction term representing the joint effect of fiscal capacity and D1
D2y/cy = interaction term representing the joint effect of fiscal capacity and D2

Data

We used data for the 50 states for 1994 for per capita grants, U.S. population, population under age 18, population over age 60, wages, unemployment, lane miles, vehicle miles, and housing. For minority and urban populations we used 1990 data. Finally, we used average 1992-1994 data for fiscal capacity and the population in poverty. Table IV.1 defines the variables used to estimate the model.

Table IV.1: Definitions of Variables

Variable (Index)	Definitions
Grant	A state's per capita grant allocation divided by (1) the U.S. average per capita grant allocation and (2) the rental/wage cost deflator (c), which adjusts for state differences in the costs of providing services.
Fiscal capacity (TTR)	A state's average per capita total taxable resource base divided by the U.S. average per capita resource base, all divided by the rental/wage cost deflator (c).
Poverty	The share of a state's average population living under the poverty line divided by the share of the U.S. population living under the poverty line.
Unemployment	The share of a state's population that is unemployed divided by the share of the U.S. population that is unemployed.
Minority	The share of a state's population classified as minority divided by the share of the U.S. population classified as minority.
Urban	The share of a state's population living in urban areas divided by the share of the U.S. population living in urban areas.
Population under 18	The share of a state's population under the age of 18 (a proxy for school age children) divided by the share of the U.S. population under the age of 18.
Population over 60	The share of a state's population over the age of 60 (a proxy for the senior citizen population) divided by the share of the U.S. population over the age of 60.
Vehicle miles	The per capita number of interstate vehicle-miles travelled in each state relative to the per capita number of vehicle-miles travelled in the U.S.
Lane miles	The per capita interstate lane-miles in a state divided by the per capita interstate lane-miles in the U.S.
Housing	The per capita share of a state's housing stock built before 1939 divided by the per capita share of the U.S. housing stock built before 1939.
Dummy - very small states (D1)	Takes the value 1 for states with populations less than .25 percent of the U.S. population and 0 for all other states.
Dummy - small states (D2)	Takes the value 1 for states with populations between .25 percent and .50 percent of the U.S. population and 0 for all other states.
Interaction D1	The product of D1 and the TTR index.
Interaction D2	The product of D2 and the TTR index.

Because the variables are expressed relative to other states, each state's index should be compared to 1.00, the national average. Table IV.2 displays the data on each variable. For example, Rhode Island has a per capita, cost-adjusted, fiscal capacity index (TTR) of 0.95, very close to the national average. However, Rhode Island has a per capita, cost-adjusted grant allocation index of 1.24, which is 24 percent above the national

average. In contrast, Florida, with a TTR index that is also close to average (0.93), has a grant allocation index of 0.76, which is 24 percent below average. Table IV.3 is a correlation matrix of the data.

Table IV.2: Data on Variables

State	Grant	TTR	Housing	Lane miles	Vehicle miles
AL	1.08	0.92	0.51	1.17	1.08
AK	2.92	1.34	0.16	4.95	0.99
AZ	0.94	0.88	0.18	1.52	1.03
AR	1.16	0.90	0.53	1.19	1.04
CA	0.86	0.95	0.53	0.58	1.02
CO	0.87	1.02	0.73	1.41	1.07
CT	0.95	1.15	1.43	0.73	1.22
DE	1.18	1.23	0.81	0.45	0.71
FL	0.76	0.93	0.22	0.62	0.82
GA	0.91	0.99	0.42	1.14	1.49
HI	1.36	0.99	0.31	0.31	0.62
ID	1.26	0.93	0.80	2.79	1.07
IL	0.96	1.07	1.44	0.99	0.99
IN	0.90	1.00	1.31	1.09	1.19
IA	1.09	1.04	1.96	1.48	0.92
KS	1.01	1.07	1.39	1.84	0.97
KY	1.19	0.96	0.87	1.12	1.20
LA	1.21	0.97	0.58	1.10	1.06
ME	1.10	0.94	2.29	1.55	0.87
MD	0.81	1.02	0.81	0.70	1.20
MA	1.34	1.07	2.21	0.67	1.07
MI	1.02	0.98	1.17	0.80	0.94
MN	0.93	1.07	1.37	1.11	1.00
MS	1.45	0.85	0.45	1.32	0.87
MO	1.05	1.03	1.18	1.28	1.38
MT	1.98	0.94	1.28	7.16	1.19
NE	1.15	1.11	1.73	1.55	0.86
NV	0.85	1.09	0.14	2.04	1.11
NH	0.95	1.01	1.67	1.12	0.93
NJ	0.88	1.06	1.33	0.43	0.66
NM	1.44	0.90	0.43	3.19	1.59
NY	1.09	1.06	1.97	0.49	0.53
NC	0.89	1.05	0.55	0.77	0.87
ND	2.00	1.02	1.48	4.61	0.95
OH	0.96	1.01	1.41	0.83	1.13
OK	1.07	0.92	0.74	1.53	1.14
OR	1.13	0.96	0.90	1.28	1.11

Poverty	Unemployment	Minority	Urban	Population under 18	Population over 60	D1	D2	Interaction D1	Interaction D2
1.16	0.94	1.35	0.81	0.98	1.04	0.00	0.00	0.00	0.00
0.64	1.29	1.18	0.85	1.21	0.42	1.00	0.00	1.34	0.00
1.05	1.01	0.92	1.10	1.07	1.04	0.00	0.00	0.00	0.00
1.18	0.86	0.89	0.71	1.00	1.15	0.00	0.00	0.00	0.00
1.20	1.38	1.57	1.22	1.06	0.84	0.00	0.00	0.00	0.00
0.66	0.75	0.56	1.04	1.02	0.82	0.00	0.00	0.00	0.00
0.65	0.96	0.69	1.11	0.92	1.10	0.00	0.00	0.00	0.00
0.59	0.88	0.99	0.96	0.95	1.00	0.00	1.00	0.00	1.23
1.10	1.05	0.84	1.10	0.89	1.40	0.00	0.00	0.00	0.00
1.00	0.86	1.42	0.81	1.03	0.81	0.00	0.00	0.00	0.00
0.62	0.97	3.36	1.17	0.99	0.96	0.00	1.00	0.00	0.99
0.90	0.95	0.26	0.71	1.15	0.92	0.00	1.00	0.00	0.93
0.95	0.94	1.13	1.15	1.00	0.99	0.00	0.00	0.00	0.00
0.86	0.86	0.49	0.87	0.98	1.01	0.00	0.00	0.00	0.00
0.73	0.67	0.17	0.83	0.99	1.19	0.00	0.00	0.00	0.00
0.87	0.89	0.51	0.93	1.03	1.07	0.00	0.00	0.00	0.00
1.30	0.84	0.41	0.70	0.97	1.02	0.00	0.00	0.00	0.00
1.72	1.18	1.71	0.93	1.10	0.92	0.00	0.00	0.00	0.00
0.87	1.18	0.09	0.62	0.94	1.09	0.00	1.00	0.00	0.94
0.72	0.89	1.48	1.08	0.97	0.89	0.00	0.00	0.00	0.00
0.68	1.03	0.54	1.17	0.90	1.08	0.00	0.00	0.00	0.00
0.97	0.96	0.87	0.96	1.02	0.98	0.00	0.00	0.00	0.00
0.79	0.74	0.28	0.93	1.04	0.97	0.00	0.00	0.00	0.00
1.55	1.01	1.89	0.63	1.08	0.98	0.00	0.00	0.00	0.00
1.04	0.81	0.64	0.93	1.00	1.10	0.00	0.00	0.00	0.00
0.90	0.84	0.36	0.68	1.06	1.05	0.00	1.00	0.00	0.94
0.67	0.50	0.32	0.90	1.04	1.10	0.00	0.00	0.00	0.00
0.79	1.07	0.70	1.01	0.99	0.92	0.00	0.00	0.00	0.00
0.59	0.83	0.10	0.69	0.98	0.93	0.00	1.00	0.00	1.01
0.69	1.12	1.08	1.22	0.93	1.07	0.00	0.00	0.00	0.00
1.35	0.95	1.19	0.93	1.15	0.88	0.00	0.00	0.00	0.00
1.11	1.06	1.36	1.16	0.95	1.04	0.00	0.00	0.00	0.00
0.97	0.73	1.23	0.66	0.95	0.99	0.00	0.00	0.00	0.00
0.74	0.66	0.28	0.74	1.03	1.14	1.00	0.00	1.02	0.00
0.90	0.90	0.64	1.01	0.98	1.05	0.00	0.00	0.00	0.00
1.26	0.90	0.92	0.91	1.03	1.07	0.00	0.00	0.00	0.00
0.79	0.94	0.36	0.90	0.97	1.06	0.00	0.00	0.00	0.00

(continued)

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State	Grant	TTR	Housing	Lane miles	Vehicle miles
PA	1.04	1.02	1.99	0.71	0.66
RI	1.24	0.95	1.96	0.49	0.86
SC	1.07	0.92	0.46	1.19	1.18
SD	1.88	1.06	1.71	4.84	1.23
TN	0.95	1.00	0.55	1.15	1.33
TX	0.98	0.98	0.38	1.03	1.03
UT	1.03	0.86	0.59	2.72	1.58
VT	1.51	0.96	2.37	2.84	1.11
VA	0.81	1.03	0.58	1.01	1.33
WA	1.10	1.05	0.83	0.90	1.14
WV	1.52	0.87	1.41	1.58	1.16
WI	0.99	1.02	1.60	0.70	0.72
WY	2.46	1.21	0.92	9.87	2.12

Poverty	Unemployment	Minority	Urban	Population under 18	Population over 60	D1	D2	Interaction D1	Interaction D2
0.85	0.98	0.60	0.95	0.92	1.23	0.00	0.00	0.00	0.00
0.74	1.18	0.45	1.21	0.92	1.18	0.00	1.00	0.00	0.95
1.16	1.02	1.58	0.72	0.99	0.95	0.00	0.00	0.00	0.00
0.99	0.54	0.44	0.67	1.11	1.13	0.00	1.00	0.00	1.06
1.15	0.80	0.86	0.50	0.96	1.01	0.00	0.00	0.00	0.00
1.24	1.07	1.22	1.03	1.10	0.82	0.00	0.00	0.00	0.00
0.63	0.62	0.30	1.09	1.35	0.70	0.00	0.00	0.00	0.00
0.64	0.84	0.08	0.43	0.96	0.96	1.00	0.00	0.96	0.00
0.67	0.83	1.14	0.91	0.94	0.88	0.00	0.00	0.00	0.00
0.77	1.06	0.55	0.97	1.01	0.91	0.00	0.00	0.00	0.00
1.41	1.25	0.20	0.50	0.90	1.21	0.00	0.00	0.00	0.00
0.73	0.85	0.40	0.88	1.01	1.05	0.00	0.00	0.00	0.00
0.75	0.89	0.30	0.86	1.10	0.89	1.00	0.00	1.21	0.00

Table IV.3: Correlation Matrix of Data

Variable	Grant	Housing	Lane miles	Minority	Population under 18
Grant	1.0000				
Housing	0.0430	1.0000			
Lane miles	0.8070	-0.0090	1.0000		
Minority	-0.0930	-0.5590	-0.2980	1.0000	
Population under 18	0.3960	-0.3680	0.4890	0.0250	1.0000
Population over 60	-0.2700	0.4470	-0.2250	-0.2620	-0.6330
Poverty	-0.0600	-0.3400	-0.1010	0.3030	0.0960
Unemployment	0.0510	-0.1740	-0.1910	0.3210	-0.1600
Urban	-0.3430	-0.1290	-0.3390	0.3330	-0.0250
Vehicle miles	0.2510	-0.2640	0.5630	-0.2060	0.4040
TTR	0.3580	0.1270	0.2390	-0.0700	-0.0430
D1	0.7360	0.0870	0.6450	-0.1780	0.2230
D2	0.1930	0.2140	0.1530	-0.0450	-0.0040
Interaction D1	0.7770	0.0360	0.6680	-0.1520	0.2640
Interaction D2	0.1890	0.2010	0.1380	-0.0340	-0.0130

Population over 60	Poverty	Unemployment	Urban	Vehicle miles	TTR	D1	D2	Interaction D1	Interaction D2
1.0000									
0.1300	1.0000								
-0.1380	0.3150	1.0000							
-0.0620	-0.2230	0.2500	1.0000						
-0.3280	0.0990	-0.2030	-0.1750	1.0000					
-0.2780	-0.5370	-0.0600	0.2020	-0.0370	1.0000				
-0.2970	-0.2610	-0.0080	-0.2810	0.2430	0.3990	1.0000			
0.0970	-0.2500	-0.0140	-0.1490	-0.2120	0.0010	-0.1290	1.0000		
-0.3530	-0.2590	0.0350	-0.2490	0.2590	0.4590	0.9900	-0.1270	1.0000	
0.0950	-0.2590	-0.0320	-0.1400	-0.2210	0.0420	-0.1280	0.9950	-0.1270	1.0000

Multicollinearity among the possible regressors did not appear to be a serious problem.[5] In addition, variance inflation factors that measure the degree of association between each independent variable and all the other independent variables in the model suggested that collinearity was not a problem in our sample.[6]

Estimation Results

We first estimated the model using ordinary least squares (OLS). The results of this regression are shown in table IV.4.

[5]All the correlation coefficients for the independent variables were less than 0.7. A correlation coefficient of 0.8 or higher indicates a degree multicollinearity that could make the measure of the statistical significance of an independent variable unreliable. The correlation coefficients between the dummy and interaction variables did exceed the 0.8 threshold—0.990 for very small states and 0.995 for small states. However, this was not a concern because high correlations are a standard result for an interaction variable that is a multiplicative function of a dummy variable.

[6]The variance inflation factors for the need and fiscal capacity variables were well below the threshold value of 10.0, which would indicate a potentially harmful degree of multicollinearity. The variance inflation factors for the dummy and interaction variables did exceed the threshold. However, as noted previously, this was not a concern.

Table IV.4: Regression Results of Models

	Model	
Index	OLS	Weighted LS
TTR	-0.401 (-0.699)	-0.218 (-0.537)
Housing	0.170[a] (2.880)	0.195[a] (4.274)
Lane miles	0.108[a] (3.449)	0.108[a] (3.663)
Minority	0.146[b] (2.290)	0.180[a] (4.079)
Population over 60	0.252 (0.713)	0.186 (0.626)
Poverty	0.119 (0.674)	0.051 (0.363)
Population under 18	0.611 (0.950)	0.919 (1.594)
Unemployment	0.108 (0.458)	0.165 (0.837)
Urban	-0.293 (-1.375)	-0.475[c] (-2.665)
Vehicle miles	-0.122 (-0.876)	-0.149 (-1.211)
D1	-3.306[a] (-3.285)	-3.575[a] (-4.238)
D2	-1.055 (-1.273)	-0.755 (-1.116)
Interaction D1	3.603[a] (3.768)	3.778[a] (5.493)
Interaction D2	1.180 (1.473)	0.907 (1.398)
Constant	0.336 (0.242)	0.058 (0.048)
Adjusted R^2	0.862	0.979

Note: t-statistics are shown in parenthesis.

[a]significant at the 99 percent confidence level

[b]significant at the 90 percent confidence level

[c]significant at the 95 percent confidence level

The model explained 86 percent of the variation in per capita grant allocations. Although the sign of the fiscal capacity variable, TTR, was negative as hypothesized, the variable was not statistically significant.

According to this result, controlling for costs and a variety of need indicators, the fiscal capacity variable had no impact on per capita grant allocations to the larger states, which received 94.2 percent of the grant allocations we analyzed. Also, the dummy variable representing very small states was significant at the 99 percent confidence level; the dummy variable representing small states was not significant. Furthermore, the interaction variable for very small states was positive and significant at the 99 percent confidence level. These results suggest that a very small state with average needs and fiscal capacity would receive 30 percent higher grant funds per capita than a larger state with the same needs and fiscal capacity. They also suggest that per capita grant allocations were a positive function of fiscal capacity for the states that benefitted most from hold harmless provisions in formulas.

The coefficients for lane-miles, age of housing, and minority population were positive and statistically significant, suggesting that relatively more per capita grant funds were allocated to states with greater lane-mileage, older housing stock, and higher minority populations, weighted for their different population shares. The coefficients for the other six need indicators in our model were not statistically significant. As noted previously, because we used program-specific need indicators to explain the variation in aggregate grant allocations, caution must be used in drawing conclusions about the significance or insignificance of any particular need indicator.

We tested whether the variance of the error terms of our estimated equation was homoscedastic or constant by using a basic version of the White test.[7] The results suggested that the age of housing variable was significantly associated with the error term and that we should reject the hypothesis that the variance of the error terms was constant. In technical terms, this is known as heteroscedasticity. This indicated that, while the OLS estimated coefficients were unbiased, the standard errors could be biased, making tests of the statistical significance of the coefficients

[7]This test calls for (1) regressing the square of the residuals from the OLS estimate on each of the independent variables, (2) performing a chi-square test on the results, and (3) examining each independent variable for statistical significance, indicating that the non-constant error is associated with that variable.

imprecise. To correct for this potential bias, we re-ran the equation using independent variables that were weighted by the age of housing variable.[8]

The results of the weighted model are also shown in table IV.4. The weighted version of the model explained almost 98 percent of the variation in per capita grant allocations. In this version, the fiscal capacity indicator continued to be statistically insignificant, have a negative coefficient, and the dummy and interaction variables had essentially the same order of magnitude and significance as in the unweighted model.[9] However, in this version, the per capita grant funds a very small state with average needs and average fiscal capacity would receive were only 20 percent higher than the funds a larger state with the same average needs and fiscal capacity would receive.

From all of these results, we concluded that a state's fiscal capacity was not an important factor in targeting most closed-ended grant funds to lower-capacity states. Moreover, we concluded that for very small states, per capita grant allocations were a positive function of fiscal capacity.

[8]We used the SPSS weighted least squares command, which divided the observations for each independent variable by each housing observation raised to a variety of powers ranging from –2.0 to 2.0, in 0.5 increments. The program then selected the power that maximized the log-likelihood function. In this case, the program selected the 1.5 power. For a more detailed discussion of the weighted least squares technique, see Damodar N. Gujarati, Basic Econometrics, 3rd ed. (New York: McGraw Hill, 1995), pp. 362-366 and 381-383.

[9]The coefficient for school age population became borderline significant. Urban density also became significant, but had a negative sign, indicating greater urban density was not associated with higher grant allocations.

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Challenges in Measuring Targeting Factors

In our analysis of grant targeting, we discussed how many of the formula grants we reviewed used poor proxies to measure state program needs,[1] fiscal capacities, and cost differentials. In this appendix, we define in greater detail the three targeting factors and discuss how numerous formula grants contained measures that were poor proxies for those factors.

Formula Factors Target Needs, Fiscal Capacity, and Costs

Experts in public finance generally agree that targeted grants are designed to allocate funds according to three formula factors:

- Workload: A proxy for the share of a state's population needing services relative to the national average. For example, the ratio of each state's low-income children to its population relative to the U.S. ratio would be a possible workload factor to distribute funds from the Maternal and Child Health Services Block Grant.
- Fiscal Capacity: A proxy for a state's ability to generate revenues from its own economic resources within the limits of its taxing authority. We have suggested the use of a U.S. Department of the Treasury-developed proxy, total taxable resources (TTR), because it captures all potential sources of taxes.
- Cost Differential: A proxy for the relative costs of providing program services in a state, such as the formula used to determine the cost of producing housing in the HOME Investment Partnerships Program.

Formula grants—which comprise the vast majority of federal grant funds to states—are allocated to beneficiaries according to a mathematical statement that contains statistical measures, such as state population or per capita income. The effectiveness with which a formula grant targets funds depends on both the presence of the factors cited above and the quality of the statistical information used to measure the factors.

Many Formulas Use Poor Proxies to Measure Targeting Factors

A formula could contain measures of workload, fiscal capacity, and costs that would, in theory, target funds in the most equitable way. However, if a proxy used to measure a factor was inadequate, the distribution could still be inequitable. Numerous GAO reports on formula grant programs have found that formula factors used to allocate funds were often poor proxies

[1]In this appendix, we use state to mean state and local governments and/or their agencies.

for measuring communities' needs, fiscal capacity, or costs of providing services.[2]

Workload Factors Are Not Always Good Proxies for Program Needs

Several of our reports have shown that formula workload factors were not appropriate proxies for the program recipients' needs. For example, in 1995 we reported that applying the formula factors specified in the Ryan White Comprehensive AIDS Resources Emergency Act of 1990 results in double counting the number of cases living in eligible metropolitan areas. Although, recent legislative changes have reduced the double-counting,[3] the needs indicators still favor more urbanized states. As a result, the oldest eligible metropolitan areas receive more generous funding, and newly emerging areas with more recent growth in AIDS cases receive less funding.

The Maternal and Child Health (MCH) program was created in 1981 when 10 categorical program grants were consolidated into one block grant. Federal funding was allocated in the same proportions originally established under these 10 programs. In 1992 we reported that this method of distributing funding did not compensate states for their varying concentrations of children at risk. To distribute program funds in a more targeted manner, we recommended that the MCH formula use a state's concentration of at-risk children as a proxy for programmatic needs. Nevertheless, the MCH formula still distributes funds according to its 1981 allocations.

Population a Poor Proxy for Workload

Sixteen of the 149 grant formulas we reviewed used state population shares as a basis for allocating grant funds. Such population data is a poor proxy for workload because it allocates funds to states in proportion to the number of people in the state, not in proportion to the number of people who may actually need the program services. For example, the formula for the Child Care for Families At-Risk of Welfare Dependency program allocates funds to states based on a state's share of the child population of the United States rather than its share of the child population at-risk. This means that states that have a higher population of at-risk children relative to other states would not receive a higher share of program funds, thus reducing the amount of funds the state can spend on

[2]References to GAO reports on targeting issues can be found on the Related GAO Products list at the end of this report.

[3]In May 1996, the Congress enacted and the President signed the Ryan White Care Act Amendments of 1996, PL 104-146, partially correcting the formula that produced the inequities.

each child and creating disparities in the provision of child care services for at-risk children.

Furthermore, when combined with workload factors in a grant formula, a population factor may dilute a workload factor's allocational effects. For example, the Environmental Protection Agency's Hazardous Waste Management State Program Support program uses three workload factors in its allocation formula: (1) the number of hazardous waste management facilities in a state, (2) the amount of waste produced, and (3) state population. Although the formula allocates funds largely based on the two workload factors, the use of a population factor could reduce the allocation of funds to states with greater needs in favor of states with higher populations.

Per Capita Income a Poor Proxy for Fiscal Capacity

Per capita personal income (PCI) is the fiscal capacity measure most commonly used in federal grant formulas. As defined and compiled by the Department of Commerce, PCI is intended to measure the income received by state residents including wages and salaries, rents, dividends, interest earnings, and income from nonresident corporate business. It also includes an adjustment for the rental value of owner-occupied housing on the ground that such ownership is analogous to the interest income earned from alternative financial investments.

Nevertheless, PCI is a relatively poor choice for measuring fiscal capacity primarily because it does not comprehensively measure income. In particular, PCI fails to capture income that is produced in a state, but not realized (such as corporate retained earnings and unrealized capital gains). Furthermore, PCI ignores tax exporting. The income of nonresidents received from activities within a state is considered relevant to a state's fiscal capacity because taxation of such income (for example, through retail sales, other excise taxes, or corporate income taxes) reduces the burdens on resident taxpayers. On both grounds, PCI is a relatively poor indicator of fiscal capacity.

We previously reported that total taxable resources (TTR) is a better measure of fiscal capacity than PCI because it is a more comprehensive indicator of economic income and addresses tax exporting.[4] TTR, developed by the U.S. Department of the Treasury, is an average of PCI and per capita gross state product (GSP). GSP measures all income produced

[4]Maternal and Child Health: Block Grant Funds Should Be Distributed More Equitably (GAO/HRD-92-5, April 2, 1992).

within a state, whether received by residents, nonresidents, or retained by business corporations. By averaging GSP with PCI, the TTR measure covers more types of income than PCI alone, including income received by nonresidents. Thus, the use of a TTR-based measure of fiscal capacity would improve the targeting of program funds to states with lower fiscal capacities.

The choice of fiscal capacity measure is particularly important for open-ended grant programs, such as Foster Care IV-E Program and Medicaid, which account for about 40 percent of all grant funds to state and local governments. For open-ended programs, the federal government's share of the total program costs varies according to a state's fiscal capacity. Currently, such reimbursement is made on the basis of a PCI-based measure called the federal medical assistance percentage (FMAP), which ranges from 50 percent for wealthier states to 80 percent for poorer states. In 1990 testimony on how fairness in the Medicaid formula could be improved, we stated that the differences in TTR and PCI were substantial.[5] As a consequence, the federal share of Medicaid was too low in states where fiscal capacity was overstated by using PCI.

State Spending a Poor Proxy for Costs

Only 12 percent of the formula grants we reviewed contained a factor designed to target more funds to states with higher costs associated with providing services. However, we found that for most of those grants state expenditure data were used to allocate funds instead of a measurement of actual program cost differentials. We have reported that service costs can differ substantially from state to state, and federal grants that do not contain a cost factor purchase fewer services in the states with higher costs. We have also reported that using state expenditure data as a proxy for costs can introduce perverse incentives to an allocation formula.

For example, in 1994 we found that the existing funding formula used to allocate funds to states under title III of the Older Americans Act of 1965 did not take into account the sometimes substantial differences in service costs from state to state.[6] Because scant data existed on the actual costs of providing title III services, we recommended modifying the formula to incorporate a broad-based cost index we developed that we believed provided a reasonable proxy for title III service costs. We noted that a broad-based index was preferable to an index constructed from program

[5]Medicaid Formula: Fairness Could Be Improved (GAO/T-HRD-91-5, December 7, 1990).

[6]Older Americans Act: Funding Formula Could Better Reflect State Needs (GAO/HEHS-94-41, May 12, 1994).

expenditures because using a state's program expenditures could have the perverse effect of rewarding the states that inefficiently administered the program. In their comments on our report, the Administration on Aging voiced its concern about using GAO's broad-based cost index because judgment had been used to construct it. In response, we commented that we believed our methodology for developing the index was reasonable and conservative and that a similar cost measure was currently included in two other federal grant formulas.

Likewise, in our report on remedial education programs[7] we cited several problems in the use of per-pupil expenditures, the cost factor used to allocate federal education grant funds.[8] A state's cost may have been higher because it (1) had a greater fiscal capacity, (2) chose to procure more expensive educational instruction, or (3) gave education a relatively higher funding priority. The formula did not differentiate between the reasons for differences in average state spending. Instead, it allocated fewer funds to the states that either could not or did not spend as much on education.

[7]The Chapter 1 program, authorized by Chapter 1 of Title I of the Elementary and Secondary Education Act of 1965, provides the largest share of federal assistance to elementary and secondary school students. These funds are used primarily to hire remedial education instructors.

[8]Remedial Education: Modifying Chapter 1 Formula Would Target More Funds to Those Most in Need (GAO/HRD-92-16, July 28, 1992).

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Addressing the Deficit: Updating the Budgetary Implications of Selected GAO Work (GAO/OCG-96-5, June 28, 1996).

Highway Funding: Alternatives for Distributing Federal Funds (GAO/RCED-96-6, November 28, 1995).

Ryan White Care Act of 1990: Opportunities to Enhance Funding Equity (GAO/HEHS-96-26, November 13, 1995).

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